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Globalization without Cosmopolitanism - Three Essays in International Economics

Samuel Delpeuch

Thesis supervised by

Thierry Mayer, Professeur des Universités, Sciences Po

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Jury

Thierry Mayer, Professeur des Universités, Sciences Po
Isabelle Méjean, Professeur FNSP, Sciences Po
Mathieu Parenti, Professeur titulaire, PSE *(reviewer)*
Vincent Vicard, Deputy-Director and Head of the international trade team, CEPII
Banu Demir, Associate Professor of Economics, University of Oxford *(reviewer)*

Note to the Reader/Note au lecteur

The acknowledgments are written in French except for a couple of sentences oriented towards English-speaking colleagues. A French version of the introduction of this dissertation is added at the end of it.

The three chapters of this dissertation are self-contained research articles and can be read separately. They are preceded by an introduction which summarizes the research presented in this dissertation and gives an overview of the field of international economics. The terms “paper” or “article” are used to refer to chapters. Chapter 1 and 2 are co-authored, which explains the use of the “we” pronoun.

Les remerciements sont rédigés en français à l’exception de quelques phrases destinés à des collègues anglophones. Le reste de cette thèse est écrit en anglais bien que l’introduction et qu’un résumé de chaque chaptire soient présentés en français à la fin de ce document.

Les trois chapitres qui composent cette thèse sont des papiers de recherches indépendants bien que reliés par une problématique sous-jascente que l’introduction cherche à clarifier. Les chapitres 1 et 2 sont co-écrits ce qui explique le recours au pronom ”nous” lors de l’évocation des auteurs.

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Introduction

Largely absent from the economic glossary, "cosmopolitanism" is an old philosophical concept, by which the mere human nature would confer political rights to everyone, above and beyond national borders. In the late 18th century, Immanuel Kant was the first to lay the foundation of a political philosophy of "cosmopolitanism". While this idea of a "perpetual peace" (Kant, 1795) mostly went down in history as an utopia, Kant depicts the rise of global rule of law as an unavoidable process fueled by the unsustainable chaos of wars and global unrest. The Kantian view of cosmopolitanism was indeed intrinsically linked with his philosophy of history and more generally to his philosophy of cognition. To reach this conclusion, Kant relies on a teleological view of History, by which noisy individual actions make sense when aggregated over space and time, completing an overarching goal. In this perspective, the human reason, lowest common denominator of humankind, shall help sublimate the global unrest into an well-organized society. Behind this intuition of "unsocial sociability" (Kant, 1784), Kant depicts an optimist mechanism where global disputes and tensions bear their resolution within them.[1]

This philosophical background is key in understanding the epistemological roots of the modern and contemporaneous analysis of globalization. In political science, the liberal view of globalization has long remained deeply rooted to this consequentialism: pull and push forces associated with globalization are seen as the seeds of peace (Montesquieu, 1758), inevitably leading to the "end of history" (Fukuyama, 1992) and global integration. In economics, a striking translation of this mechanical sublimation of diverging interests towards a mutually beneficial cooperation can be found in the Ricardian notion of comparative advantages (Ricardo, 1817), which, even today, remains a cornerstone of international trade and international economics. Yet, three centuries after Kant, not only is the cosmopolitanism out of sight but the mere process of globalization is under fire. A growing discontent around globalization and the achievement of multilateral institutions – sometimes presented as milestones towards cosmopolitanism – is observed nowadays. Leaving the description of some aspects of this backlash to the three chapters of this dissertation,

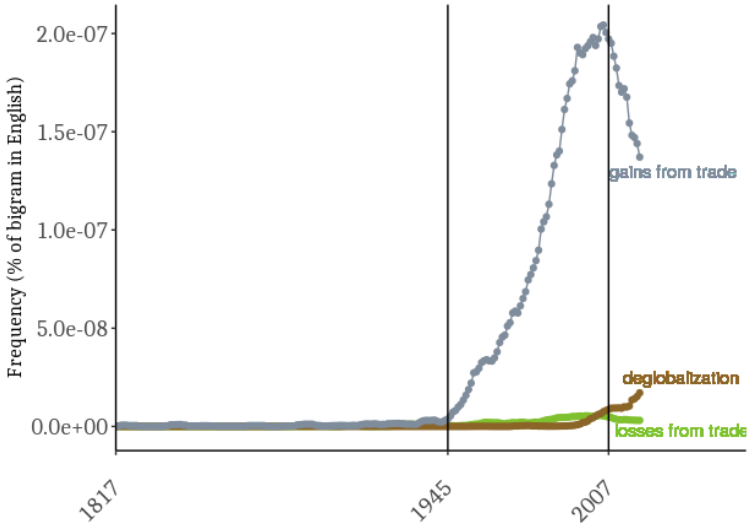
[1] In this respect, Kant transposes at the global scale Smith's idea of the invisible hand of market although he recognizes that the human nature is in practice much more prone to conflicts ((Kant, 1784), 4th proposition).

this introduction will (i) ask to which extent, by opposition of the liberal view of globalization, globalization could be seen as a self-defeating process (ii) understand the methodological and epistemological implications of this alternative view (iii) position the three chapters of this dissertation within this and summarize them.

The Wishful Literature on Globalization

The trade and macroeconomic literature on globalization has been largely dominated by the scrutiny of these gains from trade at the expense of the issues arising from globalization. Figure 3.15 reflects the occurrence of the expression "gains from trade" within the Google Books Ngram sample since its first occurrence recorded in 1815, two years before Ricardo's Principles of Political Economy and Taxation and compares it the occurrences of "losses from trade" or "deglobalization".

Fig. 1. Occurences of "gains from trade" compared to "losses from trade"



The asymmetry observed between the focus on gains and the scrutiny losses from trade might reflect an heuristic bias by which the mutually beneficial effect of trade is studied because it is hoped. Yet, following the 2008 financial crisis, the general literature seems less prolific on the "gains from trade". In the forenote of his 2010 book on the globalization paradox, Dani Rodrik notes that "[e]conomists and policy advisers have exhibited myopia far too long toward the tensions and frailties that economic globalization generates (…). The problem is not that economists are high priests of free market fundamentalism, but that they suffer from the same heuristic biases as regular people. They tend to exhibit groupthink and overconfidence, relying excessively

on those pieces of evidence that support their preferred narrative of the moment, while dismissing others that don't fit as neatly" (Rodrick, 2011). The groupthink pointed by Rodrick may well find epistemological and philosophical roots in the Kantian teleological idealism and in the appealing notion of "unsocial sociability" whereby global unrest is nothing but a fuel for deeper international integration. Far from this optimist view, recent evidences suggest to the contrary that international cooperation and transnational activities may backfire against globalization itself (Foessel, 2013). This negative feed-back loop could conversely be described as a form of "social unsociability".

When Globalization Shoots itself in the Foot

More than two decades after the entry of China in the World Trade Organization (WTO), the scientific consensus regarding the economic effects of the "China shock" has significantly changed (Autor et al., 2016). The "gains from trade" associated with an enlarged free-trade organization promised by the economic models of the early 2000s appear largely offset by side effects, notably on labor markets, on strategic dependencies or norms and standard weakening. Beyond the mere case of China, the notion of a "backlash against globalization" is taking shape within the economic literature following the surge of populist parties in developed countries. Digging into individual opinions on globalization, (Colantone et al., 2022) describe the electoral shift against pro-globalization parties and the rise in protectionist interventions. They then show the theoretical channels of the "pain from trade", that is, the ways through which trade openness can generate individual discontent. Key ingredients for understanding this backlash include aversion against inequality, loss of sovereignty and strategic prerogatives. With these aspects in mind, the 'social footprint' of process of globalization might play against the ultimate utopia of cosmopolitanism. Even aggregated at the State level, deeper trade integration and globalization might be self-defeating. The first chapter of this dissertation shows how deeper trade integration and wider trade imbalances can backlash against trade itself by fueling protectionist policies to save domestic job.

Moreover, international trade can destabilize geopolitical status quo. Challenging the liberal view according to which international trade prevents conflict by increasing inter-dependencies and therefore the cost of war, (Martin et al., 2008) show that global trade is indeed increasing global inter-dependencies (and hence reducing the risk of world wars) but decreasing local ones, fueling local conflicts. The list of hidden costs from globalization is long but the global warning and environmental externalities associated with trade might be the more concerning one.

Globalization without Cosmopolitanism

The absence of global institutions capable of mitigating the adverse effects of globalization is a key feature of the global economy that should be studied as such. This legal and political void represents a fundamental difference in the nature of international public economics compared to closed economy contexts. Typically, any central planing welfare analysis applied at the global scale feeds a wishful vision of the global order and should be understood as such. The description of international trade as a positive-sum game relies on the underlying assumption that redistribution is possible and cost-less. These so-called Kaldor-Hicks criteria characterizing the efficiency of trade are equivalent to posing the existence of a global social contract where agents (i) agree on theory of justice (ii) built efficient institutions achieving the implied welfare objectives. (Antràs et al., 2017) propose two adjustments by adding costly-redistribution and inequality-adverse agents and show that the ultimate gains from trade are substantially affected by these two amendments. Yet, the standard tools of welfare economics cannot fully be copy-pasted from the domestic to the international context for several reasons. At the personal level, the specificity of international trade is probably less the rise of inequality than the existence of unfairness, as suggested by Rodrik. Following Rawls' intuition of a social contract that could include deviation from pure equality as long as these inequalities (a) these inequalities benefit the bottom of the distribution and (b) are based fair equality of opportunity. These non-utilitarist welfare criteria are clearly violated by the the process of globalization that bring together Nation States characterized by heterogeneous norms, rules and socio-economic landscapes. Second, there is an institutional void that prevent traditional welfare criteria to be fully relevant in the global context. Given the multiplicity of layers and the variety of stake-holders at the global scale, the domestic welfare criteria and the corresponding institutions fall short to overcome trade-induced shocks. The very superficial definition of welfare - usually solely defined as real income - combined with the absence of global social contracts calls for an ad-hoc analytical framework of international public economics and more research in that direction.

Un-casual causality

Beyond the absence of contractual cosmopolitanism, one could argue that global norms appear *de facto* as a result of the global nature of various agents: firms trading across borders, an NGOs campaigning in various jurisdictions, a multinational enterprise implementing managerial habits in several countries, a international organization setting-up multilateral conventions… An empirical approach of globalization shifts the research focus from a normative approach to a positivist approach of globalization. As for the vast majority of economic fields, international economics has largely taken an empirical turn. Yet, here again, the specificity of the global context makes

it hard to apply naively standards empirical tools used in other fields, and in particular causal inference strategies. The first issue arising is the multiplicity of layers at stage within the global economy. One can broadly distinguish three layers: the intra-national level, the inter-national level and the trans-national level:

- At the intra-national level, agents – usually firms or individuals – are often perceived as atomistic players taking the their economy's openness as given. Yet, economists – and international economists in particular – should be given credits for carefully taking into account the high level of heterogeneity of individual and firms resulting in asymmetrical effect of globalization within an economy (Melitz, 2003). In this respect, the improving access to micro-level data is a game-changer and an important fuel for scientific progress. Beyond the mere observation of important heterogeneity among individuals and firms, an even more recent strand of literature focus on the top of these distributions. On the corporate side, the macroeconomic fluctuations are heavily driven by a limited number of large multinational corporations (Gabaix, 2011). On the individual size, the concentration on wealth among the top deciles of the income distribution suggest that more attention should be devoted to understanding the behavior of these very rich individuals (Piketty, 2013). This important concentration of wealth and value creation within a relatively limited number of agents in turn weakens the atomistic paradigm and opens the door to a connected research avenue aiming at understanding the influence of "happy few" on their environment and on globalization in particular. While the come-back of market power within the international economic literature has been the focus of many papers describing value sharing in the global economy, the political and normative power is slightly less studied in spite of its crucial role in shaping the global landscape. Yet, a growing strand of the literature of political economy and international trade looks at the inter-linkages between political and economic power in the context of globalization. Because of their increased means and stake to influence their regulatory environment, biggest multinational corporations and richest capital owners are increasingly exerting influence, through lobbying and norm diffusion (see.(Blanga-Gubbay et al., 2020)) This aspect of globalization in turn complexifies the causal relationship between economies' openness and individual behavior.
- At the inter-national level, States are important units of observation with their own rationale, raison d'être and life horizon. At this level, statistical studies and causal inference approaches of globalization bumps into the issue of the transmission of causality from lower-layer to upper-layer. First, States are themselves composed of local and regional institutions often ignored in the international economic literature. Moreover, while the atomistic nature of individual firms or individual forming a given economy can be acceptable under some circumstances, States are highly reflexive and strategic players. While access to

micro-level observation and scientific reductionism more broadly enables understanding important organic relationships and to pin-down elasticities, it falls short in capturing the hollistic nature of States, which embeds more than the summation of their component. In addition, States and non-States jurisdiction constitute a sample of slightly more than 200 observations and shocks likely to affect State-to-State relationship are typically big and rare events for which the external validity remains very limited. Beyond the epistemological question of the existence of higher-level causation, the empirical literature at the country level is also impeded by the quality of the data. At the country level, the data – and more importantly national accounts - should itself be understood as the result of institutional context. (Lane and Milesi-Ferretti, 2007) and (Zucman, 2013) were among the first to show that tax avoidance across States was generating systematic inconsistencies on the balances of payments. Here again, the lens through which globalization can or cannot be studied appears consubstantial with the globalization process itself. This largely explains the relative decrease of country-level empirical studies published in prominent academic journals. Yet, the limitations associated with cross-country studies regarding causal inference should prevent researchers from studying States' and sub-national bodies' behavior towards globalization given the role that these actors still play in shaping the global economy and the global institutions.

- Globalization is also shaped by trans-national actors operating across and beyond national boundaries. The first conceptual foundation of the expression "trans-national" is found in Raymond Aron's theory of international relation and is negatively defenied as the set of institutions and relationships that cannot be reduced to the intra-national or inter-national levels. With this broad definition, many institutions fall into the trans-national category and may participate in different ways to the (de)globalization: social networks, religious communities, supranational institutions like the European Union, international organizations, NGOs, multinational firms... While international organizations or non-governmental institutions are clearly lead by political motives and explicit views on global justices principles, other trans-national networks contribute to the diffusion of norms and values in a more indirect way. Yet, the existence of global cultural references, social standards and legal instruments is also shaped by these actors, as the third chapter of this dissertation suggests with the example of Investor-State Disputes Settlement and investment law. The existence of transnational actors limits the relevance of conceptual intra- and inter-national frameworks. Empirically, the transnational nature of institutions also raises challenges due to the complexity. At the firm level, free-movement of capital and tax optimization is associated with systematic mismeasurement of firms contribution of national income as shown in the second chapter of this dissertation. Here again, the question of the measurability

and the observation of trans-national actors is key for the future of the empirical research around globalization. The SigWatch initiative is an instance of data collection on NGO activity around the globe aiming at filling this gap ((Hatte and Koenig, 2020)). The activity of multinational firms is also improving. In some industry where the production is sufficiently standardized as the car industry, information can be gathered on transportation and production choices. Yet, the access to balance-sheet information and ownership links for multinational firms can still be improved. The opacity associated with tax havens leads to a systematic worsening of data coverage in low-tax jurisdiction and the absence of global administration explains the absence of international tax fillings that would typically be robust to this institutional feature. The long-standing push by advocacy groups like the Tax Justice Network to implement Country-by-Country reporting for multinational firms has finally materialized within the anti-Base Erosion and Profit Shifting guidelines put in place by the Organization for Economic Coordination and Development (OECD), which in turn made possible a better economic assessment of multinational production and ultimately alternative taxation schemes at the global scale. This last example shows the interconnections between transnational actors, global governance and the analysis of globalization.

To sum up, the increasing influence of empirical work and causal inference push applied economists to look for non-social events (random shocks, natural discontinuities, controlled experiments…) capable of getting rid of the complexity of historical and constructed relationships in order to highlights some aspect agents behaviors. While these methods present obvious appealing features, they seem in general ill-suited for the analysis of globalization characterized by various layers of players with different life-horizon, means, atomiciticity and degrees of reflexivity. Moreover, the comparability and the access to good-quality data is more challenging in an international context. Finally, it is worth noting that the naturalist and deterministic vision of the world to which this strand of empirical economics leads is also to be linked with the classical – and the Kantian – philosophy of cognition in which the ontologic existence of a order exists and can be inferred in spite of the apparent chaos. Here again, the complexity of globalization is a serious challenge to that epistemological view and should be taken as such to avoid what Eric Monnet called “The Unbearable Lightness of Economists”.

Staying positiv(ist)

One the most successful strand of literature within international economics is without doubt the gravity equation, describing the determinant of international trade. The back and forth between theoretical approaches and empirical studies has largely contributed to the maturity of international trade as a field (see (Head and Mayer, 2014)). The structure brought by the theoretical con-

tribution on the determinant to trade have helped the empirical investigations and, conversely, the statistical assessment of the competing explanation to trade have help validating or invalidating some driver. Because the "structural" approach does not try to get rid of the endogeneity associated with complex systems characterized by multiple layers, aggregation issues, conflicting incentives and feed-back loops effects, it is certainly better suited to understand the pull and push forces of globalization. While the vast majority of scientific contributions on geopolitics and international political economy are found in political science or in international relation, the structural approach developed in international trade is a promising adjunction to make sense of the complexity of these interactions.

Alternative approaches than the attempt to identify causal relationships are therefore useful to make sense of complex, constructed and historical institutions. It should not come as a surprise that many papers written on trade and investment policies often try to understand disputes and tensions. The incompleteness of the global governance and the shortcomings of institutions like the UN or the WTO highlight the rival nature characterizing the international relations and the international economic interests in particular. The international political economy puts the rival nature of international relation as the main angle through which globalization should be analysed. In her essay 1970's "International Politics and International Economics: A Case of Mutual Neglect" Susan Strange points the academic void between international relation and international economics. Instead she calls for an international political economy that would given a prominent place to the notion of power within the narratives around globalization. Taking into account the empirical challenges and the methodological advances described above, the study of globalization would certainly shed a new light on the backlash against globalization and on the forces at stake behind it.

Far from achieving this research agenda, the three chapters of this thesis try to provide an empirical description of various aspects of the backlash against globalization. Since they are centered around States' behavior, Chapters 1 and 3 also try to provide theoretical framework capable of capturing States' incentives in a globalized world but where their political space is bounded by other players and where no global institution can act as a central planner. The second chapter differs slightly in that it is centered around the unfitness of national accounting (and therefore national policy making) with the transnational nature of multinational firms. Overall, this dissertation aims at describing a globalized world where cosmopolitanism remains out of sights.

Chapter 1: Trade Imbalances, Fiscal Imbalances and the Rise of Protectionism: Evidence from G20 Countries

In May 2017, Donald Trump tweeted: "We have a MASSIVE trade deficit with Germany, plus they pay FAR LESS than they should on NATO and military. Very bad for U.S. This will change". In, April 2018, in reference to the trade war with China, the then-president tweeted: "When you are already dollars 500 Billion DOWN, you can't lose!" In December 2018, Trump wrote: "I am a Tariff Man. When people or countries come in to raid the great wealth of our Nation, I want them to pay for the privilege of doing so. It will always be the best way to max out our economic power. We are right now taking in $ billions in Tariffs. MAKE AMERICA RICH AGAIN". These tweets point to trade imbalances as a potential origin to trade tensions. Should we take these tweets seriously and should we think that they simply reflect the specific circumstances of the Trump presidency now behind us?

Economists have focused their interest in quantifying the consequences of recent protectionist tensions. Their verdict is clearly negative: for example, (Amiti et al., 2019) and (Fajgelbaum et al., 2020) explore their impact on prices and welfare. (Erceg et al., 2018) investigate the impact of such measures in a neo-keynesian model. Most economists also believe that tariffs and trade policies have very little effect on multilateral trade imbalances which are traced to macroeconomic movements in saving and investment. This is confirmed in a small open economy model by (Barattieri et al., 2021) and empirically by (Furceri et al., 2018).

Building on the Global Trade Alert (GTA) database which provides very rich information on bilateral protectionist interventions from 2009 onward (Evenett and Fritz, 2020), we empirically analyse the causes of the recent rise of protection and test the Trump tweets by focusing on the role of bilateral trade imbalances. Our econometric analysis shows that bilateral trade imbalances as robust predictors of protectionist attacks. This is not only the case for the US although it is stronger for the US than for other countries. This was also the case before the Trump presidency and our results suggest that trade imbalances will continue to be a source of trade tensions after the Trump presidency. To our knowledge, our paper is the first to provide robust evidence on this relation. This result should be of interest for both trade economists and macroeconomists. The fact that multilateral trade imbalances cause protectionist attacks suggests that global imbalances is not only a concern because of macroeconomic reasons but also because of the trade tensions they can generate. As for bilateral trade imbalances, they are largely absent of macroeconomic analyses. We show that they can lead to protectionist attacks with their own macroeconomic impact and therefore we believe that they should be more studied in the macroeconomics literature. As for trade economists interested in the rise of protectionism, our results point to the

macroeconomic origins of the issue.

Fiscal expansion, fiscal austerity and the rise of protectionism. We also study the role of fiscal policies in the rise of protectionism. It has long been recognized the fiscal stance of countries can drive trade imbalances. This is for example the position of the IMF (see World Economic Outlook (2020)) which points to the tight fiscal policy in Germany as a contributor to its large trade surplus or the expansionary fiscal stance of the US as a factor of its trade deficit. This is the "twin deficit" result that the Mundell-Fleming model and the New Open Economy Macroeconomics would generate. Several empirical papers provide evidence on the role of fiscal policy in trade imbalances. To strengthen our argument on the causal impact of trade imbalances on protectionism, we therefore use as an instrument for the multilateral trade balance of a country the budget balance of this country. As for bilateral trade imbalances between two countries, we use the difference in budget balances between the two, discounted by bilateral distance. This is also consistent with recent research which points to the interaction of macroeconomic factors and of gravity equation type factors as crucial drivers of both bilateral and aggregate trade balances (see (Cunat and Zymek, 2023)). Our results on the impact of bilateral and multilateral trade imbalances are robust to this instrumental variable strategy.

The reduced form result that country-pairs with very large differences in fiscal policies are more prone to protectionist tensions, is also interesting *per se*. Our results suggest that for instance in the case of the US and Germany (and more generally the EU), the difference in fiscal policy between the two countries may at least partly be at the origin, through its impact on bilateral trade balances, of the protectionist attacks of the US.

The quantitative impact of trade imbalances on the rise of protectionism is sizable for G20 countries: an increase of one standard deviation of the bilateral trade balance between two countries corresponds to a 7.3% increase in protectionist intervention between the two countries.

Our results suggest that if globalization, both in its trade and financial dimension, has generated more bilateral and multilateral trade imbalances, then it may also generate protectionist forces that may endogenously put a brake to globalization. Trade imbalances are also often seen as a source of concern because of their macroeconomic consequences in particular in terms of either foreign debt accumulation or demand deficit. Our results suggest that they have a further potential negative impact in aggravating trade tensions.

A transatlantic gap in the fiscal response to COVID and potential renewed trade tensions. Finally, international cooperation in macroeconomic policies (especially fiscal policies) has been viewed as important to reduce the possibility of a free-rider problem where countries with more

restrictive fiscal policies (and larger trade surpluses) reduce global demand but benefit from other countries expansionary fiscal policies. This is for example a criticism addressed towards some EU countries by the US administrations. The fiscal stimulus in reaction to the COVID crisis is likely to be larger in the US than in the EU or China and our results show that countries that act as "consumers" of last resort through their fiscal policy and incur trade deficits as a consequence do retaliate via protectionist actions. Hence, our analysis suggests that protectionist tensions that find their origin in macroeconomic imbalances will not disappear with the end of the Trump presidency.

Chapter 2: Productivity Slowdown and Tax Havens: where is measured value creation?

In 2021, the gross value added per worked hours in the tradable sector was two times bigger in Ireland than in France. While the efficiency of Irish workers is indisputable, their statistics may be rosier than it acutally is and they might be significantly helped by the low level of corporate taxation. In this chapter we ask to which extent tax avoidance biases national statistics and productivity measurement in particular.

Multinational enterprises (MNEs) tend to be very large and intangible-intensive firms that can choose strategically how they book activities across their affiliates around the world, with the potential to significantly distort aggregate statistics. In particular, in a context of deep financial integration and international tax competition, the growing intangible economy has provided new tools for MNEs to offshore their profits to low-tax countries. This, in turn, artificially minimises activity in high-tax countries, leading to underestimations of a number of aggregates including value-added, exports, and productivity. There is growing evidence that with the deeper international financial integration process that we have observed in the past decades, complex structures aiming at reducing the tax bills of MNEs significantly distort official production statistics. For instance, (Tørsløv et al., 2022), who estimate that around 40% of global profits in 2015 were shifted to tax havens, revise worldwide official statistics adjusted by profit shifting and suggest that in case of France, the trade balance deficit disappears. Furthermore, the digitalisation of activities pushing firms to invest more in intangibles has resulted in a steady rise in the importance of intangible investment relative to tangible investment over the past 20 years, which has overtaken tangible investment GDP share in major advanced countries around the 2008 global financial crisis. Despite the fact that techniques to reduce tax payments within MNEs have been around for some time, decoupling capital location from production and value location (e.g. intellectual property rights) and transfer mispricing (i.e. absence of 'arm's-length prices' for intangibles) have become

much easier with the rapid rise of intangible capital. The question of the localisation of value creation is therefore key in this context.

To estimate the magnitude of this tax-related mismeasurment of productivity in France, the second chapter of this dissertation uses firm-level data, mixing information on firms' ownership relations (foreign and domestic, related to parents and subsidiaries), balance sheets, trade, workforce, and wage bill over 1997 and 2015. We implement a staggered difference-in-differences (DiD) approach in order to estimate the average effect of profit shifting on the measured productivity of firms. Offshore profit shifting is identified from within-firm variation in the presence in tax havens across firm, exploiting the precise establishment of firms' new foreign presence in a tax haven or non-tax haven country. The dynamic of the productivity effect of firms' presence in tax havens is assessed within a panel event study, which, by rejecting the existence of a pre-treatment trend, allows us to show that the estimates capture the tax haven entry effect and not differential trends between treated and control units.

From an empirical standpoint both identification described above – across and within firm – present weakness in the purpose of establishing the causal relationship between tax avoidance and productivity measurement in France. Indeed, the decision whether to set up an affiliate in a low tax jurisdiction is an endogeneous decision that can itself depends upon the group productivity and profitability. One can also think of common counfounder such as changes in the top management potentially affecting both the international organization of the firm and its activity in France (see (Souillard, 2022)). To get around this identification threat, we exploit an unexpected decision from the European Court of Justice limiting the extent with which member State can apply anti-abuse rules for European MNEs with a presence in European tax havens (see (Schenkelberg, 2020) for a first use of this decision)."Cadbury-Schweppes" decision - named after the firm that challenged the UK in their appempt to tax back profits recorded in their Irish affiliates – reveals that the firms that de facto benefited from this decisions saw their productivity in France declining in the following years.

Our analysis results in an average decline of 3% in firm labour productivity and 1% in firm total factor productivity (TFP), which is most likely due to a productivity mismeasurement resulting from profit shifting. Although the MNE owing affiliates in tax haven represents a tiny fraction of the total number of firms, these firms are typically big and are known to be important drivers of macroeconomic fluctuation. We therefore quantify the macroeconomic effect of this micro-econometric estimation. This exercise shows that micro-level fiscal optimisation of MNEs translates into a drop of 0.06 percentage point in aggregate labour productivity annual growth.

This is tantamount to an annual loss of 5.7% in terms of the aggregate annual labor productivity growth.

France is an interesting case as since the mid-2000s it has become a high corporate tax country with respect to its partners, despite a relatively stable tax rate. Still, the proliferation of MNEs locating in tax havens should not be specific to France; This quantification exercise echos a similar work conducted on the US economy but relying on another methodology. (Guvenen et al., 2022) focus on US MNEs and use a formulary apportionment technique to capture the true location of economic activity. Under this method, the total worldwide earnings of US MNEs are attributed to different locations using a combination of labour compensation and sales to unaffiliated parties in each worldwide geographical location. They assess the impact of MNEs' profit shifting on different aggregates and show that the effect on value added and hence, on productivity, depends on the period that is considered. They estimate that over 2004 and 2010, the profit shifting-adjusted average annual growth of labour productivity increases by 12 basis points.

Chapter 3: Strategic litigation in a globalized world: How Investor-State Disputes Shape Policy Diffusion

Far from the contractualist vision of well-organized global governance, the legal framework surrounding the global economy is rather the result of decentralized international agreements signed between States but also the result of the actual relationship between multinational firms and States. In the third chapter, we focus on the Investor-States disputes and investigate the extent to which decision arising from these *ad hoc* bodies of investment dispute resolution participate in shaping the global regulatory environment. Recent disputes related to the the phasing-out of coal energy in the Netherlands, moratorium of oil exploration in Italy or – as studied in this paper – against anti-tobacco regulation in Australia and Uruguay shed the light on the limited regulatory space that government have in a global economy where the policy-making should also take into account foreign investor and their special legal regime.

Investor-State Dispute Settlement mechanisms are private tribunals where investors (claimant) can sue governments (respondent) breaching international investment treaties linking their country of origin and the jurisdiction of their investment. The proliferation of bilateral and multilateral investment treaties constitutes a large legal basis providing foreign investors with enlarged means to challenge harmful regulatory changes or adverse governmental decisions. Beyond the mere use of these arbitration panels for such cases, a growing concern associated with the existence of

these Investor-State dispute Settlement mechanisms relates to the anticipated litigation risk from the point of view of States and hence, regulatory chill. Because arbitrators decisions depend both on the legal content of legal treaties and the record of past ISDS cases, the litigation risk perceived by States depends both on the portfolio of investment treaties signed and the behavior of foreign investors across the globe.

While it is often stressed that international coordination is key to face global issues such as global warming, pandemics or international profit shifting, one might find it paradoxical that deeper globalization can also hinder policy diffusion. Yet, the first part of this third chapter shows that a deeper "legal integration" (or "legal globalization")– defined as an higher correlation between foreign investors' winning chances across countries – comes with an increased risk of strategic lawsuits and therefore of regulatory chill.

Using the landmark episodes of Investor-States disputes in the tobacco industry, this prediction that investor may litigate in order to hinder the diffusion of anti-tobacco policy is tested empirically. Political scientists recently gather qualitative and quantitative evidences on a potential regulatory chill effect of Investor-State cases, suggesting an existing but limited risk on State sovereignty (Moehlecke, 2019)). Building on their work, the second part of this last chapter adds two key ingredients helping to understand the relationship between legal globalisation and policy diffusion: (1) the dyadic dimension of the policy diffusion and (2) the interaction between presence of legal treaties and MNEs ownership network. Specifically we estimate a model describing the probability of adoption of a policy depending on whether this policy has been challenged in neighbouring jurisdiction. By keeping the country-pair dimension, we first aim at assessing to which extent events of Investor-State dispute exert more influence on closer countries. To do so, we rely on weighted matrices where the event of an ISDS is weighted by the degree of proximity within the country pair. Various weights are tested in order to capture several determinants of proximity. Informed by the gravity literature, our preferred specification uses bilateral trade as weighting metric as it summarizes many economic, geographic and cultural determinants. Second, we test the combination of investment treaties in force in a country with the network of affiliates of tobacco MNEs indeed is indeed associated with a higher perceived risk of litigation and therefore with a lower probability of policy adoption. Our results tend to suggest that it is the case.

Quantifying the effect found in this empirical exercise, we find that Philip Morris' litigation against the plain packaging policy against Australia decreased New Zealand's hazard rate by 4%

(-1%:-6.5% at the 95 confidence interval). Beyond the case of health policy, the methodology developed in this chapter should for instance help understanding the forces at stake around the various topic where policy could and should diffuse such as international efforts to curb tax avoidance or to phase-out of fossil fuels. From a more theoretical standpoint, this paper also suggests that the investment law play an important role in shaping the global regulatory environment. The rapid rise in multinational production combined with the mushrooming of investment treaties treaty containing ISDS clauses increase the number of precedents, which modify national State's policy space. Legal norms and regulatory behavior diffuse in a decentralized way participating to a form of globalization without cosmopolitanism.

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1

Trade Imbalances, Fiscal Imbalances and the Rise of Protectionism: Evidence from G20 Countries

Abstract

We investigate the role of trade imbalances in the rise of protectionism on the period 2009-2019 among G20 countries. Bilateral trade imbalances are robust (with various sets of fixed effects) predictors of protectionist attacks. The evidence on the impact of multilateral trade imbalances is less robust. The role of trade imbalances in the rise of protectionism is confirmed when we instrument trade imbalances by unanticipated government spending shocks. Countries with more expansionary fiscal policies react to the ensuing trade imbalance by a more protectionist trade policy. The role of trade imbalances and fiscal policies in the rise of protectionism is economically significant: a one standard deviation increase in the bilateral trade deficit of a country leads to a 8% rise of protectionist attacks by this country.

1.1. Introduction.

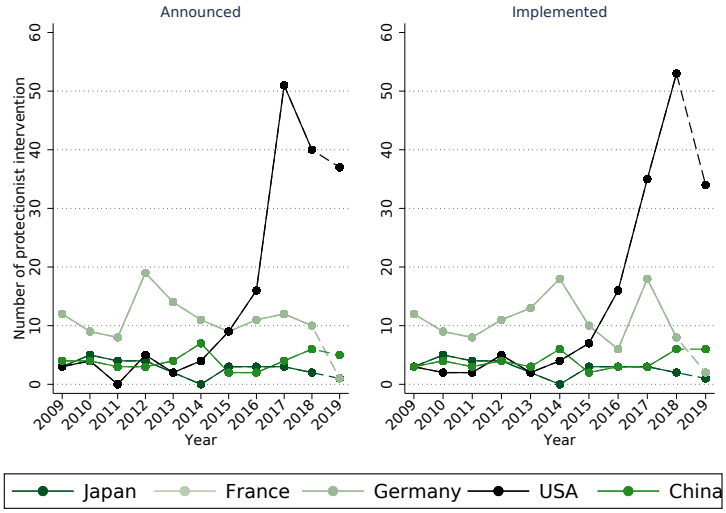
> *"We have a MASSIVE trade deficit with Germany... Very bad for U.S. This will change"*
>
> – Donald Trump , *May 2017 tweet*

> *"It's simple: When we spend taxpayer money, we should use it to buy products made in America and support jobs here at home. My Buy American Executive Order does just that."*
>
> – Joe Biden , *January 2021 tweet*

> *"We need a Buy European Act like the Americans, we need to reserve for our European manufacturers."*
>
> – Emmanuel Macron , *October 2022*

These tweets of Presidents Trump and Biden and the reaction of the French President, point to trade imbalances and fiscal policies as potential origins to trade tensions. This paper takes these quotes seriously and empirically tests the role of trade imbalances and fiscal policies in the rise of protectionism in the past decade. The following two graphs further illustrate and motivate our analysis. They use data from the Global Trade Alert (GTA) database to measure protectionist measures.[1] Figure 1.1 shows the evolution of the number of state acts announcing and implementing tariff increases. It suggests that the rise in protectionist attacks by the US has preceded the Trump presidency. Figure 1.2 shows the simple correlation between the number of tariff increases announced by the USA in 2017 for each country and the bilateral trade deficit (as a share of US gross tradable output) between the US and that country. It suggests that countries with a larger bilateral surplus were more targeted by the US, with China as a clear outlier.

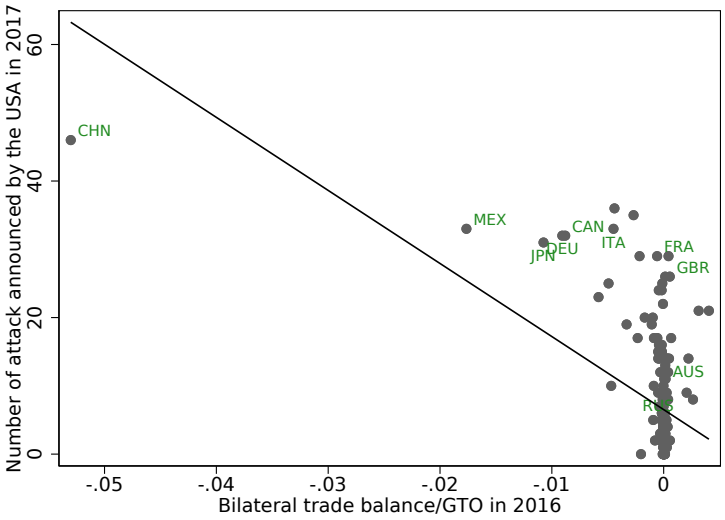
Fig. 1.1. Evolution of attacks



In this paper, we show that, during the period 2009-2019, bilateral trade imbalances are robust predictors of protectionist attacks in the G20. Multilateral trade imbalances are also associated with more protectionism but the evidence is less robust. This result applies to the US trade policy (especially during the Trump presidency) but is not solely driven by the US or the US-China trade war of 2018. To our knowledge, this paper is the first to provide robust evidence on this relation. Our main result that trade imbalances predict trade tensions should be of interest for both trade economists and macro-economists. The fact that trade imbalances cause protectionist attacks suggests that global imbalances should be a cause of concern not only for macroeconomic

[1]This database, described in detail below, provides information on bilateral protectionist interventions from 2009 onward (Evenett and Fritz, 2018).The quantitative description of the database and of the definition of the protectionist interventions is given in section 2.3.

Fig. 1.2. Protectionist attacks and bilateral trade balance



reasons but also because of the trade tensions they can generate. Furthermore, our results point to the importance of bilateral trade imbalances that, until recently, have been largely neglected by trade economists (see (Davis and Weinstein, 2002), (Cunat and Zymek, 2023) (Felbermayr and Yotov, 2021) for recent exceptions). The role of trade imbalances in the rise of protectionism is confirmed when we instrument trade imbalances by unanticipated government spending shocks based on the twin deficit mechanism. When instrumented, multilateral trade imbalances do predict protectionist attacks. In reduced form regressions, we also show that an unanticipated fiscal stimulus and a bilateral difference in unanticipated fiscal stimulus, predict protectionist attacks. This results is, to the best of our knowledge, novel and suggests that Joe Biden's quote reflects a more widespread mechanism though which governments attempt to reduce import leakages of their fiscal stimulus. In the case of the US and Germany (and more generally the EU), the difference in fiscal stance in the aftermath of the Great Financial Crisis between the two countries may partly be at the origin, through its impact on bilateral trade balances, of the transatlantic trade tensions. This result is also relevant in the context of the COVID crisis with large and heterogeneous fiscal stimulus programs as well as of the Inflation Reduction Act in the US, that combines a significant increase in government expenditures and domestic content requirements that can be interpreted as potentially protectionist. In a context of trade fragmentation and rising geopolitical and protectionist tensions (see (Aiyar et al., 2023)), it is important to understand the role macroeconomic factors in these developments.

Our finding that bilateral trade imbalances are conducive to protectionist tensions is robust both in the cross-section dimension as well as in the panel dimension: our results are valid with and

without country-pair fixed effects. We show that it is also robust to alternative ways of measuring the intensity of protectionism and to other robustness tests. The quantitative impact of trade imbalances on protectionism is sizable: a country pair with a higher bilateral trade imbalance of one standard deviation in terms will have a 8% higher level of bilateral protectionist measures. The impact of an unexpected fiscal expansion on protectionist tensions is also economically significant: for example, if a G20 government unexpectedly expands its expenditures to GDP ratio from 40% to 42% our estimates predicts that it would increase trade attacks the following year by 9.4%.

To motivate our empirical exercise, we introduce a simple theoretical framework which assumes that policy makers decide whether to increase or not bilateral tariffs based on the production gains (more than by the price effects or tariff revenues) and show a statistic that is close to the bilateral trade imbalance measures the net production gain country h to attack (through a tariff increase) another country i. On the one hand, tariffs on bilateral imports from country i lead to production gains in h that are proportional to bilateral imports as a share of h gross tradable output (GTO) . On the other hand, production losses due to potential retaliation are proportional to bilateral exports to country i as a share of gross tradable output.

Our paper speaks to several strands of literature. In trade, the focus has been put on the political economy dimension of protectionism. Trade policy decisions can be taken in response to the internal balance of power among voters or interest groups with different preferences over trade openness or protectionism (Grossman and Helpman, 1994). The predictions that protectionism is higher in industries represented by a lobby and higher in sectors with high import penetration in absence of well-organized interest groups has been validated by (Goldberg and Maggi, 1999). Recent empirical evidence using firm-level expenses in lobbying shows however that the decision whether to sign a free-trade agreement is influenced mostly by exporters (Blanga-Gubbay et al., 2020). (Ossa, 2014) shows how retaliations processes can also lead to higher tariffs. (Davide et al., 2020) analyze the use of the temporary trade barriers and investigates whether these instruments are used for retaliatory purposes. They find that a one standard-deviation increase in the number of new investigations in a sector increases the number of investigations in the opposite direction by 2.5% in other sectors and that countries are more likely to retaliate when their comparative advantage is targeted in the first place. Our paper takes into account some of the main results of this literature to control for retaliation motives in trade tensions.

Most economists and international economic organizations view the focus on bilateral deficits and surpluses rather than aggregate trade imbalances as fundamentally flawed. The standard view in macroeconomics is that bilateral imbalances do not matter for a given country overall imbalance. Bilateral imbalances are largely linked to the respective industrial structures or value

chain mechanisms and should not *per se* be a cause of grave concern. This is not the case for aggregate trade imbalances that may reflect macroeconomic imbalances signaling macroeconomic and financial risks. (Obstfeld and Rogoff, 2009) for example make the case that global imbalances and the Great Recession were "intimately connected" and (Caballero et al., 2008) also analyze how global imbalances emerge. More recently, international organizations such as the OECD, the IMF (IMF, 2020a) or the European Commission have viewed trade imbalances as risks for macroeconomic stability in connection also to the issue of excess global saving. Our paper adds to this literature by analyzing the potential impact of bilateral and multilateral trade imbalances on trade tensions.

International trade and macro economists have analyzed the potential economic impact of protectionist attacks and trade policy is now at the core of macroeconomic academic and policy discussions. For example, (Amiti et al., 2019), (Fajgelbaum et al., 2020) and (Fajgelbaum and Khandelwal, 2021) explore their impact on prices and welfare. (Erceg et al., 2018) investigate the impact of such measures in a neo-keynesian model. In these discussions, protectionist policies are taken mostly as exogenous political shocks. Most economists also believe that tariffs and trade policies have very little effect on multilateral trade imbalances which are traced to macroeconomic movements in saving and investment. This is confirmed in a small open economy model by (Barattieri et al., 2021) and empirically by (Furceri et al., 2018). Trying to estimate the effect of an elimination of all US non-tariff barriers, (Trefler, 1993) takes into account the endogenous nature of trade policies. Noting that higher levels of import fuels protection in the US, this paper tackles the simultaneity bias and finds that the effect of import restrictions is 10 times bigger when disentangled from its backlash effect on trade policy reaction. Even when taking into account the endogenous nature of trade policy, the analysis in this literature is centered on the consequences of trade policies on macroeconomic outcomes. Our paper investigates the opposite question: what are the macroeconomic determinants of these protectionist attacks ?

Our paper relates strongly to the literature on the macroeconomic determinants of trade policy decisions. This literature has focused on the impact of the business cycle and the real exchange rate. As noted by (Rose, 2012) the conventional wisdom (see (Bagwell and Staiger, 2003) for example) is that protectionism is countercyclical. He shows however that this prediction does not seem to hold after the Great Financial Crisis. (Lake and Linask, 2016) actually find that tariffs are pro-cyclical. The impact of real exchange rate movements on import protection policies is analyzed empirically by (Bown and Crowley, 2013). Their paper is close to ours as they estimate the impact of various macroeconomic factors on import protection policies for the period 1988-2010 for five industrialized economies - the United States, European Union, Australia, Canada and South Korea. They find evidence of macro-economic determinants of protectionism in the

pre-Great Recession period: increases in domestic unemployment rates, real appreciations in bilateral exchange rates, and declines in the GDP growth rates of bilateral trading partners led to substantial increases in temporary trade barriers. Our paper focuses on the role of trade and fiscal imbalances, not analyzed in previous work, but controls for GDP and real exchange rate movements.

Finally, the Great depression of the 1930s that was marked by an outbreak of protectionist policies provides an interesting comparison (see (ORourke, 2018)) with the period of the Great Recession of the 2010s we focus on. In the case of the 1930s, (Eichengreen and Irwin, 2010) show that countries that remained on the Gold Standard restricted trade more than those that allowed their currencies to depreciate. The objective of protectionist policies was then to strengthen the balance of payments in a situation that restricted other instruments to address the deepening slump. In the 1930s period, the rise of protectionism is interpreted as a second best policy in a situation where expansionary policies were constrained for countries remaining on the gold standard. Our results point to a different interpretation of the present situation : the rise of protectionism is interpreted as a consequence of differences in the stance of macroeconomic policies in response to the crisis.

Section 3.2 presents a stylized model that generates simple testable predictions. Section 2.3 then describes the data. The empirical strategy is presented in section 3.4 . We test empirically the main theoretical predictions in section 1.5 using both cross-sectional and within-dyad estimations. Section 1.6 presents the instrumental variables (government expenditure shocks) as well as reduced form regressions on the role of fiscal policies in predicting protectionist tensions. Section 1.7 is dedicated to robustness checks. Section 3.5 concludes.

1.2. Conceptual framework: manufacturing production and trade policy

We present a simple model to clarify the role of trade imbalances as determinants of protectionist interventions. We assume that when deciding on these interventions, policy makers only care about the impact on production - or alternatively employment as long as labor productivity is equal across sectors of existing manufacturing firms - and do not internalize (at least fully) the impact on consumer prices. This could be related for example to the power of lobbies representing different industry groups as in (Grossman and Helpman, 1994). Our analysis points to a trade off between production gains for import competing firms and production losses for exporting firms at risk of retaliation. This is a reduced form perspective but there is evidence by (Di Tella and Rodrik, 2019) that demand for trade protection responds for example to labor concerns. More recently, (Fajgelbaum et al., 2020) focus on the political economy rationale behind the rise of

protectionism in the US. They show that import tariffs provided the most protection to sectors that tend to be geographically concentrated in Rust Belt states. Our framework is clearly not general equilibrium and therefore can not be interpreted as an analysis of the relations between trade imbalances and the labor market as in (Dix-Carneiro et al., 2021) in which trade imbalances arise from savings choices of the representative households which in turn affect the labor market.

Firms in the manufacturing sector produce for the domestic and the foreign markets. The manufacturing sector will be taken as the whole tradable sector as we believe that determinants of protectionist attacks on the natural resources or agricultural sectors are different. The trade-off at work to choose whether and which country to target with a protectionist intervention is the following: on the one hand, such a measure decreases foreign competition and increases gross tradable output N_h^D in country h in the manufacturing sector that produces for the domestic market but on the other hand it potentially hurts output N_h^X for firms that export because of possible expected retaliation from the targeted country. This trade-off determines which countries are more likely to be targeted by an attack. On the import side, (Fajgelbaum et al., 2020) find large declines of bilateral imports when the US tariffs were implemented. Imports of varieties targeted by US tariffs fell by an average of 31.7%. On the export side, they find that retaliatory tariffs to US protectionist attacks resulted in a 9.9% decline in US exports. The trade model we use to clarify this trade-off is standard monopolistic competition with Z countries where the number and location of manufacturing firms is fixed. Labor is the only production factor. The elasticity of substitution between varieties is $\sigma > 1$. In this kind of model, manufacturing output of country h producing for the domestic market is:

$$N_h^D = \gamma n_h p_h^{-\sigma} E_h P_h^{\sigma-1} \tag{1.1}$$

where γ is the share of manufacturing in consumption, n_h is the number of manufacturing firms (which we take as constant) producing in country h, p_h is the price of the manufacturing good, E_h is total expenditure in country h and P_h is the manufacturing price index defined as:

$$P_h = \left(\sum_{k=1}^{Z} n_k \left(p_k \tau_{hk} \right)^{1-\sigma} \right)^{1/(1-\sigma)} \tag{1.2}$$

where τ_{hk} is the bilateral iceberg trade cost between countries h and k which we take as the policy choice. An increase in this trade cost is what we call a protectionist intervention. Because it raises the price index, it reduces foreign competition and increases production of firms active on the domestic market of h. The positive impact of an increase bilateral trade costs τ_{hi} between h and i

on manufacturing production for the domestic market in h is given by:

$$\frac{\partial N_h^D}{\partial \tau_{hi}} \frac{\tau_{hi}}{N_h^D} = (\sigma - 1) \frac{Imp_{h,i}}{E_h} \tag{1.3}$$

where

$$Imp_{h,i} = n_i \left(p_i \tau_{hi}\right)^{1-\sigma} E_h P_h^{\sigma-1} \tag{1.4}$$

is the value of total imports of h from i. Hence the production gain from attacking country i increases with the share of bilateral imports in total expenditures of country h. We assume that country h anticipates a possible retaliation (a symmetric rise in τ_{ih}) to the protectionist attack towards country i so that it takes into account the negative impact on production in the export sector. We assume the policy maker in h puts a probability $q_{h,i}$ that i will retaliate. Production in firms that export from h to i is given by

$$N_{h,i}^X = n_h p_h^{-\sigma} \tau_{ih}^{1-\sigma} E_i P_i^{\sigma-1} \tag{1.5}$$

where P_i the price index in country i is $P_i = \left(\sum_{k=1}^{Z} n_k \left(p_k \tau_{ik}\right)^{1-\sigma}\right)^{1/(1-\sigma)}$. The expected impact of the protectionist retaliation of country i on production in the manufacturing sector of h exporting in i is given by:

$$\frac{\partial N_{h,i}^X}{\partial \tau_{hi}} \frac{\tau_{hi}}{N_{h,i}^X} = -q_{h,i} (\sigma - 1) \left(1 - \frac{Exp_{h,i}}{E_i}\right) \tag{1.6}$$

There are two effects as indicated in the last parenthesis. The main negative direct impact on exports and production comes from higher trade costs. However, this effect is mitigated because the price index in i increases due to higher trade costs from h. This mitigating effect is more important if a large share of the price index or of the expenditure in i is due to exports from h. Initiating a trade war with country i and anticipating possible symmetric retaliation therefore produces the following expected effect on total gross tradable ouput N_h:

$$\frac{\partial N_h}{\partial \tau_{hi}} \frac{\tau_{hi}}{N_h} = (\sigma - 1) \left[\frac{Imp_{h,i}}{E_h} \frac{N_h^D}{N_h} - q_{h,i} \left(1 - \frac{Exp_{h,i}}{E_i}\right) \frac{N_{h,i}^X}{N_h}\right] \tag{1.7}$$

The first positive term in the parenthesis measures the protection gained from increasing the price of goods imported from country i that compete with goods produced by h firms for the domestic market. Importantly, expenditures E_h are not proportional to GDP if the country runs a trade imbalance. Indeed, $E_h \equiv GDP_h - TB_h$ where $TB_h \equiv Exp_h - Imp_h$ is the trade balance of country h. The second term measures the manufacturing production losses due to the fall in exports to the targeted country that would retaliate. Importantly, because protectionist measures are applied

on tradable goods only, we will measure N_h by using Gross Tradable Output (GTO) of country h. We can then transform equation (1.7) that gives a measure of the net manufacturing production gain of attacking country i into terms related to observed trade imbalances and macroeconomic variables:

$$\frac{\partial N_h}{\partial \tau_{hi}} \frac{\tau_{hi}}{N_h} = (\sigma - 1) \left[\frac{Imp_{h,i}}{GTO_h} \left(\frac{GTO_h - Exp_h}{GDP_h - TB_h} \right) - q_{h,i} \frac{Exp_{h,i}}{GTO_h} \left(1 - \frac{Exp_{h,i}}{GDP_i - TB_i} \right) \right] \tag{1.8}$$

The two elements in the bracket highlight the opposite effects of a trade war: the positive impact of lower competition from lower imports from i and the negative impact of lower expected exports to i. The sum of these two elements is close but not equal to the bilateral trade balance between h and i as a share of the GTO of h. Note indeed that both bilateral imports and exports ratios are weighted by a coefficient less than unity. On the former, lower bilateral imports reduce competition only for the share of domestic expenditures ($GDP_h - TB_h$) that is served by firms producing for the domestic market ($GTO_h - Exp_h$). Note that a large multilateral trade deficit ($TB_h < 0$) reduces the incentive to attack a given country i because in this case, the substitution away from this country would mostly benefit producers outside of country h. Hence, the weight on bilateral imports in the first term is plausibly less than unity.

Exports from h to i are weighted by the probability of expected retaliation. The last element in the bracket $\left(\frac{Exp_{h,i}}{GDP_i - TB_i}\right)$ reveals that when exports of h to i are a large share of expenditures in i, there are less domestic and foreign competitors who would gain from retaliation by i. Hence, the loss of exports to country i is mitigated. The two elements in the bracket are close enough to the bilateral trade balance that when we go to the data we will, in most regressions, approximate it by the bilateral trade balance (as a share of GTO). In other regressions, we will separate bilateral imports and exports (again as a share of GTO). Furthermore, in some regressions, we will also test precisely the bilateral exports and imports weighted by the exact parameters predicted by the model to relate the incentive for protectionist actions to the exact gain predicted by the model.

In our simple framework, the impact of a protectionist attack on output entirely goes through an increase in the price index captured in the first term of equation (1.8). Hence, if country h policy maker cares at least partly about the cost for consumers of a protectionist policy (that increases the domestic price index) this will then reduce the coefficient on this first term, the bilateral imports that affect the price index. Hence, bilateral imports would still matter but would enter with a different weight. Note also that intermediate goods and global value chains are absent from our framework. The trade-off would be affected by their presence because tariffs on imported intermediate goods may decrease the competitiveness of exporters.

Note the role of GDP and GTO in these predictions. First, the size of GTO matters because the potential gain of attacking one country depends on the bilateral imports to domestic production ratio. However, this effect is weighted by the ratio of net of exports GTO to net of trade balance GDP (see first term in bracket of equation 1.8).

1.3. Description of data

We use the Global Trade Alert (GTA) database ((Evenett and Fritz, 2018)) to measure protectionist measures. This database provides information on state interventions that affect global trade from 2009 onward. It identifies State interventions fulfilling 5 conditions: (1) be unilateral actions (2) alter the relative treatment of domestic commercial interest compared to foreign ones ("relative treatment test") (3) in a meaningful and (4) credible way and (5) that shall not be subject to higher motives.[2]

We focus on harmful protectionist interventions, leaving aside liberalizing interventions that are of very different nature: while tariff cut are typically decided in the framework of negotiations, tariff increases are decided unilaterally based on implementing country's own interest. The GTA database classifies interventions depending on their nature (tariff, quotas, export subsidies, FDI related interventions...). Based on this classification, we define four categories of protectionist attacks. Type 1 attacks are restricted to all tariff increases whatever the motive, including anti-dumping or anti-subsidy. Type 2 adds non tariff measures such as anti-dumping measures, import quotas, local content and trade-balancing measures (see table 1.11 in appendix 3.7 for a precise definition). Types 3 and 4 are even broader and include measures on migration that we do not interpret as purely protectionist.[3] In the core of our empirical investigation, we choose the most restrictive definition of protectionist attacks (type 1 i.e. tariff increases) and use broader definitions only for robustness checks. Following the GTA methodology, a protectionist intervention is defined as an announcement by a government body of country h of a change of policy instrument resulting in a restriction of trade with country i. For the remaining of the paper, we define the variable att_{hit} as a protectionist intervention announced by country h toward country i at time t. The year recorded to count a protectionist attack is the year of announcement not of implemen-

[2]Regarding the meaningfulness of the act, as explained in the handbook of the database "State acts that merely prolong a relevant earlier act without meaningful change are submitted as an update to the original state act. The team member is advised to seek feedback before submitting borderline cases." Credibility implies that implementation is enacted (mere speeches, declaration or tweets are not counted as intervention).

[3]For an analysis of the different measures of protectionism since 2009, see (Evenett and Fritz, 2018)

tation. However, if an announced intervention is not observed to be implemented in our data we do not count it. Finally, if a measure announced and implemented is then reversed later on, we count a protectionist intervention the year of announcement but do not record any change when it is reversed. The number of interventions can therefore only be positive or null.

The literature (see for example (Bown and Crowley, 2013)) analyzing the determinants of trade restrictions has mostly focused on temporary trade restrictions and used the Temporary Trade Barriers (TTB) database. This database records all investigations initiated within the WTO framework (anti-dumping procedures, countervailing duties or global safeguards). GTA records protectionist measures that are also initiated by a government on a unilateral basis outside of the WTO framework. This is the case of the activation of section 232 by President Trump in 2018: the tariffs imposed on steel and aluminum were not implemented as a temporary trade barrier and are therefore not included in TTB. [4] One advantage of the Global Trade Alert database is that it integrates the protectionist measures taken after 2009 outside of the WTO framework and that are essential to understand the rise of protectionism during this period.

An attack between two countries is considered as an attack by GTA only if the exporting country exports more than USD 1 million of at least one HS6 product affected by the intervention. This way of measuring protectionism does not take into account the amount of trade at stake. Even though an attack can potentially target multiple products, our measure also does not indicate how many products (tariff lines) are affected by the intervention. Also, several countries can be hit by one attack. For instance, when on March 23 2018, President Trump imposed tariffs on steel and aluminum under the "national security" provision of US trade law (section 232), 74 countries exported at least 1 million USD of steel products and were therefore counted by GTA as affected by the measure. In this example, not all countries were targeted for the same products: 9 products exported by France were hit by the US decision while Hungary was affected by the measure for only one HS6 product. By contrast, Malta was *de jure* hit by the US decision as a member of the European Union but is not considered as hit by the measure on steel since it exports less than USD 1 million to the US. In this example, Malta is not considered as attacked by the USA but France and Hungary are considered as equally affected and face one attack from the US on that date. Lastly, an alternative measure of protectionist attacks is to weight them by the amount of trade for the corresponding tariff line. In the previous example, 851 millions USD of French export were targeted by the US intervention against 44 millions USD of Hungarian export.

[4] Countries hit by these tariffs retaliated by using TTB instruments but the initial intervention was taken outside of the WTO framework.

Table 1.1: Descriptive statistics

	Mean	Median	SD	Min	Max	N
Full sample						
Intervention (dyad X year)		0.00				641,542
Intervention (dyad X year) | attack		1.00				31,223
Nb of country by intervention		46.50				31,223
G20						
Intervention (dyad X year)		1.00				3,366
Intervention (dyad X year) | attack		2.00				2,473
Nb of country by intervention		37.83				2,473

Note : Data from Global Trade Alert. Number of attacks is annual for a dyad. The full sample includes 234 countries and territories. Data is for year 2009-2019.

In section 1.7, we check that our results are robust to these alternative measures of protectionism. In order to take into account the intensive margin of protectionist intervention, different alternative measures of protectionism are constructed and tested. Protectionist attacks are also recorded as the number of HS6 products affected by changes in their trade regime ("product level") or by the amount of bilateral trade impacted by policy changes ("amount").[5] The alternative measures of protectionist attacks are presented in robustness checks. The reason we choose to focus on the number of interventions per country pair and year is that our focus is on the macroeconomic determinants of these (political) interventions.

Table 1.1 presents descriptive statistics both for the full sample of countries (234 countries and territories) and for the G20 countries on which we focus in our regression analysis. The first line is for interventions (as defined above as tariff measures) per dyad and year.[6] For a given pair of countries and year the average number of attacks is low (0.11) in the full sample but is much larger when we restrict the sample to G20 countries (2.17). The same is true for the standard deviation.

[5]Two different measure of the amount affected by intervention are used as robustness checks. First, we use a measure directly proposed by the Global Trade Alert database where import on each HS6 products attacked are summed up and divided by the total value of bilateral imports (by h from the i). This denominator is taken as a 2005-2007 average to avoid endogeneity given the impact of trade policy changes on trade flows. We also re-construct the share of trade attacked ourselves by matching GTA at the product level with BACI and divide the share of trade affected by intervention by current total bilateral trade flows.

[6]Two interventions are dropped in the cleaning process due to their outlying scope (number of tariffs line and number of countries affected).

The second line gives the same statistics but conditional on the observation that one attack has taken place. We also report the number of countries affected by each intervention. It shows that the typical protectionist measure targets several countries. As shown in table 1.1, protectionist attacks identified by the GTA database are significantly more common among G20. This is not surprising as more than a third (37%) of international trade occurs among all the dyad that includes two of the 19 members of the G20 (EU as member excluded). These dyad with two G20 members only represent 1% of all potential dyads.[7] In addition, given the GTA's reporting process described above, interventions are likely to be more comprehensively tracked for G20 economies for which information is more easily available and the USD 1-million reporting threshold is much less likely to be binding for these countries. Because a major part of both attacks and trade occur within G20 countries and in order to reduce measurement error, we restrict the sample to G20 countries.

Bilateral trade balances are based on the BACI database designed by the CEPII and the UN COMTRADE department using bilateral flows of goods at the HS6 level for years 2009-2019 (Gaulier and Zignago, 2010). The trade balances are therefore limited to goods and exclude services. As highlighted by figure 1.3, most bilateral trade balances are close to zero. Large bilateral trade imbalances occur mostly between large economies. As suggested by the model proposed in section 3.2, bilateral trade balances should be normalized by the the tradable output. We use the data on tradable output built by (Head and Mayer, 2021) in order to compute "trade with self" within a gravity framework. Expressed in percentage of the attacking country h's GTO, the distribution of bilateral trade balance is negatively skewed. The standard deviation of bilateral trade in percentage of GTO within country is 1.4% for G20 economies (USD 15 billion). By construction, the distribution of bilateral trade balance (expressed in absolute term) would be strictly symmetric. However, normalized by country's h GTO, this slightly shifts the distribution to the right, in parts due to the strong bilateral surplus of Mexico vis-a-vis the US (around 20 % of the Mexican GTO). Multilateral trade balances are more dispersed. Due to oil price movements, Saudi Arabia is an outliers both in the size of the multilateral surplus but also in its variance over time. For the rest of the analysis, Saudi Arabia is excluded from the working dataset in order to ensure that our results are not driven by oil prices.[8] In the remaining of the paper, we test the impact of trade balances as a share of GTO, with and without dyadic fixed effects in order to exploit both variations, within and between countries. Multilateral trade balances are taken from the balance of payment database (BOP) of the IMF.

[7] According to the G20 website, the 20 members represent 80% of the world's GDP, 75% of global exports and 60% of its population.

[8] The cross-sectional and the panel results are robust to the inclusion of Saudi Arabia to the sample.

Fig. 1.3. Trade balance distribution (working dataset).

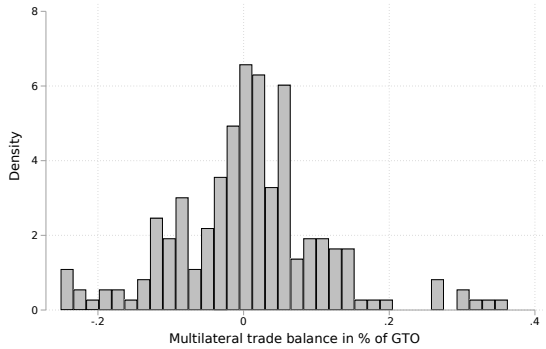


Fig. 1.4. Multilateral trade balances

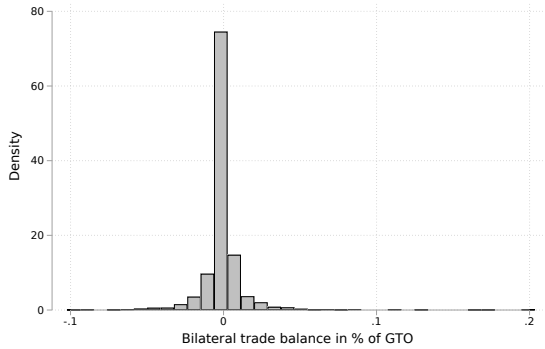


Fig. 1.5. Bilateral trade balances

Our outcome variable is a count data variable: the number of trade interventions from one country to another in a given year. This variable is always positive or null. Its distribution is left-skewed with a mass point at 0, as figure 1.6 shows. This argues in favor of a count-data model such as the Poisson or negative binomial estimators. We favor the Poisson over the negative binomial as the former is not subject to incidental parameter problem (Cameron and Trivedi, 2013). The Poisson estimator is also not subject to bias when re-scaling or changing the units of measurement of the dependent variable (Bosquet and Boulhol, 2014). Hence, following (Bown and Crowley, 2013) we use the Poisson Pseudo Maximum Likelihood regression model (Silva and Tenreyro, 2006).[9]

1.4. Empirical model

Our theoretical model provides some guidance for our estimation but no direct structural equation to test. Hence, we test several specifications. The main one focuses on the role of the bilateral trade balance and has the following form:

$$\#a_{hit} = exp\left\{\alpha + \beta\left(\frac{TB_{hi(t-1)}}{GTO_{h(t-1)}}\right) + \delta X_{hi(t-1)} + \epsilon_{hi(t-1)}\right\}$$

[9] As pointed out by (Weidner and Zylkin, 2021), three-way fixed-effect PPML gravity model can suffer from some biais. We checked and our results are not affected by this biais.

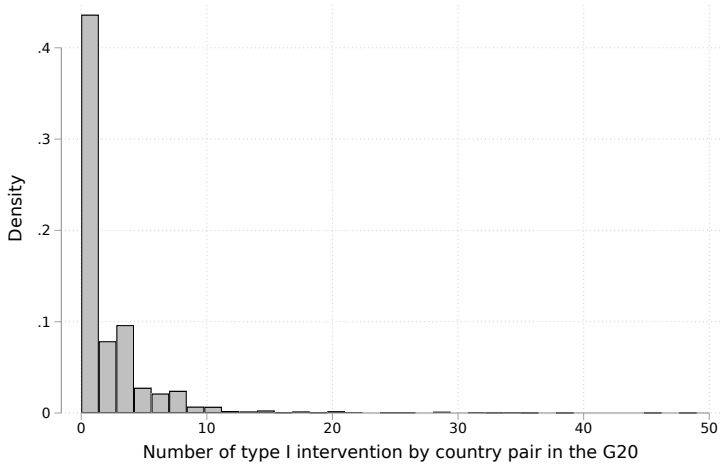


Fig. 1.6. Distribution of the number of attacks

where $\frac{TB_{hit-1}}{GTO_{h(t-1)}}$ is the lagged bilateral trade balance, the difference between exports of country h (the attacking country) to country i (the attacked country) minus import of h from i, expressed as a share of the gross tradable output of country h. We choose to lag our main variable of interest because the decision to announce a protectionist measure as a response to a trade imbalance could take some time. It also helps alleviate potential endogeneity issues although these will be addressed with instrumental variables below. X_{hit-1} is a vector of lagged controls.

All regressions control for lagged attacks of country i against h. Indeed, the retaliation motive could itself be linked to bilateral trade imbalances and therefore could bias our estimates.

Some classical gravity controls (distance, contiguity, common language, Regional Trade Agreements) are added in our regressions to control for dyadic-specific characteristics (Cunat and Zymek, 2023) and (Felbermayr and Yotov, 2021) show that bilateral imbalances can be driven by a gravity type structure. It therefore makes sense to control for these gravity controls (when they are not absorbed by dyad-fixed effects) as they may also impact protectionist tensions.

We also control for the size of countries. First, the bilateral trade imbalance is given in ratio of GTO of the home country as our theoretical framework suggests this is the approximation of the net gain of a protectionist measure by country h. Second, the size of countries may also affect the probability of retaliation $q_{h,i}$ if smaller countries (for geopolitical reasons) are less able or inclined to retaliate than larger ones. Finally, output may also matter not in the cross-sectional dimension but also in the time dimension which will be important when we test the mechanism with country-pair fixed effects. The literature on the business cycle dimension of protectionism ((Bagwell and Staiger, 2003), (Rose, 2012) and (Bown and Crowley, 2013)) points to the importance of GDP movements. These are not taken into account in our simple static model. Hence, we will

add yearly GTO of both countries as controls.

In addition, the role of bilateral trade imbalances needs to be disentangled from bilateral trade intensity which itself may reflect partly the size of trade flows. As shown by (Cunat and Zymek, 2023), trade imbalances and trade flows are structurally linked. A legitimate concern is that the relationship found between trade imbalances and protectionism partly reflects the fact that a country h carries more protectionist attacks on trade partners i with which it trades more bilaterally. Table 1.1 presented above indeed suggests that protectionist interventions are more numerous among larger economies. In the cross-section, the presence of country-pairs with large differences in size could be the main driver of trade policies decisions. Within dyad, the presence of these asymmetric country-pairs is also likely to make the results sensible to the larger country output changes. In order to overcome this "size effect" and isolate the impact of bilateral trade imbalances, we adopt different strategies. First we chose to restrict the analysis to the G20 countries sample in order to limit the asymmetry between trade partners. Limiting the sample to G20 allows to compare more homogeneous countries (in terms of size but also development, trade openness...) while still encompassing a large share of global trade. Second, and consistently with the prediction of our theoretical framework, we normalize bilateral and multilateral balances by country h's GTO. We also control for both countries' GTOs (see above) and by the trade intensity of the dyad as measured by the geometric average of the value of bilateral trade flows as in (Cunat and Zymek, 2023): $(Imp_{hi,(t-1)} \times Exp_{hi,(t-1)})^{\frac{1}{2}}$. This last term not only captures part of the size of both countries but also and more specifically the size of the bilateral trade relationship that may affect bilateral protectionist attacks.

Lastly, in the appendix, we follow closely (Cunat and Zymek, 2023) who decompose bilateral trade imbalances in levels reflect two components: the geometric average of the value of bilateral trade flows, and the proportional bilateral imbalance which is a re-weighting of the bilateral trade balance by the squared product of the bilateral exports and imports. In table 1.13, we run our estimation using their definition of "proportional bilateral imbalance" to measure bilateral trade imbalances. We also use the same sample of countries as in their paper.

Exchange rates movements are added to the empirical analysis as controls. One reason, theoretical, is that tariffs and exchange rate wars may be used as policy instruments with similar objectives as analyzed by (Auray et al., 2022). Another reason, empirical, is that real exchange rate movements have been shown to be predictors of protectionist measures (see (Bown and Crowley, 2013)) The variation in the real exchange rate (ΔRER_{iht}) is calculated based on the Consumer Price Index and the nominal exchange rates available on the World Bank database. A positive ΔRER_{ih} corresponds to a depreciation of h currency with respect to i. Table 1.11 in appendix summarizes the definitions, the sources and the main features of all variables used in the paper.

We also introduce a dummy for countries that are governed by populists (provided by (Funke et al., 2020)) that may ideologically be both more protectionist and more inclined to adopt macro economic policies that generate trade deficits.

In some regressions, we also control for multilateral trade imbalances. First, (Cunat and Zymek, 2023) show they are a potential driver of bilateral trade imbalances. Because, they could affect the use of protectionist measures, they could also bias our estimates. Second, the impact of multilateral trade imbalances on protectionism is interesting itself.

We address further endogeneity issues in section 1.6 where we use fiscal shocks as instrumental variables for trade imbalances.

In all specifications we use year fixed effects μ_t which control for aggregate cyclical factors. PPML estimation allows for more fixed effects, so that in some specifications we include country-pair (δ_{hi}), origin-year (λ_{ht}) and destination-year (λ_{it}) fixed effects.

Our simple model suggests that bilateral trade deficits are only an approximate metric of the net gain of a bilateral protectionist attack. A specification closer to equation (1.8) that takes into account the proper weights on bilateral imports and exports has the following form:

$$\begin{aligned}\#att_{hit} = exp\Big\{ \alpha + \beta_1 \left(\frac{Imp_{hi(t-1)}}{GTO_{h(t-1)}} \frac{GTO_{h(t-1)} - Exp_{h(t-1)}}{GDP_{h(t-1)} - CA_{h(t-1)}} \right) \\ + \beta_2 \left(\frac{Exp_{hi(t-1)}}{GTO_{h(t-1)}} \left(1 - \frac{Exp_{hi(t-1)}}{GDP_{i(t-1)} - CA_{i(t-1)}} \right) \right) + \beta_3 \#att_{ih(t-1)} + \epsilon_{hi(t-1)} \Big\}\end{aligned}$$

We test this equation in cross-section with only time-fixed effects but also in three way-fixed effect specification: country-pair (δ_{hi}), origin-year (λ_{ht}) and destination-year (λ_{it}) fixed effects. In all regressions, standard errors are clustered at the dyadic level.

1.5. Main results

We first present cross-sectional results for which the main source of identification is across countries. The absence of country or dyad fixed effects means we should take these first results with caution as some time invariant and potentially not observable characteristics of countries or country pairs could affect both trade imbalances and trade policy decisions. Table 1.2 displays these results. In the first column, the main variable of interest is the lagged $(t-1)$ bilateral trade balance between h and i as a share of GTO. This variable is positive when country h has a bilateral surplus with i. The sign of the coefficient indicates that a bilateral surplus of h vis-à-vis i decreases the

number of protectionist actions of h against i. In the second regression, more controls are added. Thereafter, in all regressions that do not include dyadic fixed effects, gravity control variables (common language, contiguity and distance) are added but their coefficients are not reported. We also control for the retaliation motive, by including the variable $\text{attacks}_{ih(t-1)}$ that indicates a one-year lagged attack of i against h. In all regressions of table 1.2, we indeed find that the retaliation motive is positive but small in magnitude and not always significant. We add a control for regional trade agreements (RTA) linking the two countries. The fact that a dyad with two countries belonging to the same RTA has less protectionist measures is not surprising. Following (Bown and Crowley, 2013) we also control for the real bilateral exchange rates but on the period we analyze (posterior to theirs), we do not find that a bilateral appreciation of the home currency is correlated with more protectionist attacks.[10] We also add Gross Tradable Ouput (GTO) of both countries which partly controls for country size and some country specific cyclical factors. The positive and significant coefficient on populist governments found in regression (2) and (3) suggest that these are indeed more protectionist. Once these controls are added, the coefficient on bilateral trade imbalances is reduced but it remains negative and significant at the 5% level. As mentioned in section 3.4, regressions (2) and (3) also include a control for the intensity of the bilateral trade relation. This control displays a positive and significant sign, suggesting that the beyond the size of the partners, more trade flows are associated with more protectionist interventions. However, adding this control does not alter the effect of the bilateral trade balance. Regression (3) adds the multilateral trade balance of country h. The impact of the multilateral trade balance of a country on its protectionist actions is interesting in itself and it is important to check whether the impact of the bilateral trade deficit remains present even after controlling for the total trade balance of the country. To avoid double counting we subtract from the multilateral trade balance the bilateral trade balance between countries h and i. In regression (3) the bilateral trade imbalance remains significant and negative. Multilateral trade imbalances are negatively associated with protectionist measures but are not significant in this regression. The impact of these trade imbalances is also of economic significance: a deterioration of one standard deviation of the bilateral trade balance (1.4% of GTO in the G20 sample in the between dimension) corresponds to a 8% increase in protectionist intervention.[11] For comparison, an increase of one standard deviation of the GTO of the attacking country leads to a 10% increase in attacks.

[10]Note that the link between exchange rate and tariffs can go both ways. Indeed, theoretically (see the recent analysis of (Costinot and Werning, 2019) and (Itskhoki, 2019)) the imposition of tariffs can lead to a bilateral real exchange rate appreciation. Empirically, (Furceri et al., 2021) find that this prediction holds in the short-run.

[11]In a PPML regression, when the regressor is not logged, the elasticity can be obtained the following way : $(\exp(\beta) - 1) * 100$ %. For β close to zero, this is approximately $100 * \beta$%. Here, an increase of 1 units in the x-variable is an increase of 100% of the bilateral trade balance in percentage of GDP. We adjust this variation by the corresponding standard deviation for an easier interpretation.

Finally, in the last column of the table, we directly test equation (1.8) that comes from our theoretical framework analyzed in section 2.3. In this column (5), we therefore include the bilateral imports to GTO ratio weighted by the ratio $\left(\frac{GTO_h - Exp_h}{GDP_h - TB_h}\right)$ which we call the import effect as well as the bilateral exports to GTO ratio weighted by $\left(1 - \frac{Exp_{h,i}}{GDP_i - TB_i}\right)$ which call the export effect. The only control included are past attacks for the retaliation motive as well as year fixed effects. Interestingly, both theoretically generated import and export effects have the right sign (positive and negative respectively) and are significant at the 10% level.

Table 1.2: Cross-sectional regressions

	(1)	(2)	(3)	(4)
	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$
Bilat. $TB/GTO_{hi(t-1)}$	-9.672**	-5.770**	-5.467**	
	(-2.02)	(-2.34)	(-2.37)	
$attacks_{ih,(t-1)}$		0.00538	0.00473	0.0187**
		(0.74)	(0.66)	(2.26)
$(\text{Import} \times \text{Export})^{\frac{1}{2}}_{hi(t-1)}$		0.00314***	0.00284***	
		(3.39)	(2.96)	
1 = RTA (source: WTO)		-0.300**	-0.309**	
		(-2.41)	(-2.45)	
$RER_{ih(t-1)}$		-0.000155***	-0.000151***	
		(-4.09)	(-4.08)	
$GTO_{i(t-1)}$		0.0325**	0.0343**	
		(2.24)	(2.39)	
$GTO_{h(t-1)}$		0.0132	0.0157	
		(1.31)	(1.49)	
1==populist gov. *at*		0.775***	0.771***	
		(7.23)	(7.27)	
Multi. $TB/GTO_{h(t-1)}$			-0.808	
			(-1.25)	
$Imports_{hi(t-1)}$ effect				27.13*
				(1.86)
$Exports_{hi(t-1)}$ effect				-5.186*
				(-1.76)
Year-FE	Yes	Yes	Yes	Yes
Dyad-FE	No	No	No	No
Country X Year-FE	No	No	No	No
Pseudo R2	0.04	0.17	0.17	0.04
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	3,366	3,366	3,366	3,366

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$. All columns are Poisson Pseudo Maximum Likelihood estimation. Regressions control for contiguity, distance and common language. Multi. $TB/GTO_{h(t-1)}$ is the multilateral trade balance of country h net of the bilateral trade balance $h-i$. $Imports_{hi(t-1)}$ effect $= \frac{Imp_{h,i}}{GTO_h}\left(\frac{GTO_h - Exp_h}{GDP_h - TB_h}\right)$ and $exports_{hi(t-1)}$ effect $= \frac{Exp_{h,i}}{GTO_h}\left(1 - \frac{Exp_{h,i}}{GDP_i - TB_i}\right)$.

Table 1.3 introduces country-pair fixed effects in addition to year fixed effects in the first column. This forces identification to come from the within dimension of the data as it relies on changes over time in macroeconomic variables within each dyad of countries. Regression (1) shows that a larger bilateral trade deficit of country h with respect to i predicts an increase in the number of bilateral attacks of h towards i the year after. Note that the interpretation of the coefficient on GTO is different in tables (1.2) and (1.3). In table (1.2), where the identification is mostly cross-sectional, the interpretation is that larger countries launch more attacks, whereas in table (1.3) the interpretation is that attacks are launched by countries that are doing relatively better. Hence, tariff increases, similarly to (Lake and Linask, 2016), are pro-cyclical in the past ten years. Given the inclusion of country-pair effects, the positive coefficient associated with the populist government dummy suggests that a government turning populist also applies more protectionist policies. Lastly, the positive and significant sign on the real exchange rate movement suggests that within a dyad, a real exchange depreciation of h with respect to i is associated with more protectionist measures.

In the last three columns of table (1.3), importer-time and exporter-time fixed effects are added to the dyadic fixed effects. This table therefore proposes a three-way-fixed effect specification directly borrowed from the gravity literature. The specification is the most demanding one as it controls for any country and year specific variable as well as any time-invariant country-pair variable.[12] In these regressions, any variable that is not bilateral and variable over time is absorbed by the fixed effects.

In column (2), the coefficient on bilateral trade balances remains significantly negative. This is our preferred specification as it is the most demanding to test the impact of bilateral trade imbalances on protectionist measures. Column (3) separates the effect of bilateral imports and bilateral exports. Both signs (positive and negative respectively) are those expected but only the coefficient on exports is significant in this regression. Lastly, column (4) directly tests equation (1.8) where weights on imports and exports come from our theoretical framework and with the full set of fixed effects. In this demanding specification, only the bilateral export factor has the right sign and is statistically significant.[13] This suggests the mechanism at work in equation (1.8) is present in the cross-section but not in the time dimension.

[12]The three-way fixed effect adds both a country of origin times year fixed effect as well as a destination country times year fixed effect. Therefore controlling differently for country × year specific confounding effects whether they are origin or destination countries in the dyadic relationship.

[13]We also tested the robustness of our effect after taking into account the potential 3WFE biais from (Weidner and Zylkin, 2021). Our result remains robust to this test.

Table 1.3: Regressions with country pair and country-year fixed effects

	(1) Nb att$_{h,i}$	(2) Nb att$_{h,i}$	(3) Nb att$_{h,i}$	(4) Nb att$_{h,i}$
Bilat. TB/GTO$_{hi(t-1)}$	-11.05**	-5.942***		
	(-2.56)	(-2.61)		
Multi. TB/GTO$_{h(t-1)}$	0.958			
	(1.05)			
attacks$_{ih,(t-1)}$	-0.000686	-0.00554	-0.00550	-0.00553
	(-0.08)	(-0.85)	(-0.84)	(-0.85)
(Import × Export)$^{\frac{1}{2}}_{hi(t-1)}$	0.0166***	0.00115	0.000970	
	(3.36)	(0.39)	(0.34)	
1 = RTA (source: WTO)	-0.176	0.110	0.109	
	(-1.46)	(1.03)	(1.02)	
$RER_{ih(t-1)}$	0.000531***	0.000192***	0.000193***	
	(10.27)	(3.08)	(3.08)	
$GTO_{i(t-1)}$	-0.0418**			
	(-2.00)			
$GTO_{h(t-1)}$	-0.0150			
	(-0.95)			
1==populist gov. *at*	0.753***			
	(6.75)			
Import/GTO$_{hi(t-1)}$			7.370	
			(1.63)	
Export/GTO$_{hi(t-1)}$			-6.038**	
			(-2.57)	
Imports$_{hi(t-1)}$ effect				-5.735
				(-0.66)
Exports$_{hi(t-1)}$ effect				-3.851**
				(-2.25)
Year-FE	Yes	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes
Country X Year-FE	No	Yes	Yes	Yes
Pseudo R2	0.43	0.59	0.59	0.59
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	3,366	3,366	3,366	3,366

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$. All columns are Poisson Pseudo Maximum Likelihood estimation. Multi. TB/GTO$_{h(t-1)}$ is the multilateral trade balance of country h net of the bilateral trade balance $h-i$. Imports$_{hi(t-1)}$ effect $= \frac{Imp_{h,i}}{GTO_h}\left(\frac{GTO_h - Exp_h}{GDP_h - TB_h}\right)$ and exports$_{hi(t-1)}$ effect $= \frac{Exp_{h,i}}{GTO_h}\left(1 - \frac{Exp_{h,i}}{GDP_i - TB_i}\right)$.

1.6. Fiscal policies, trade deficits and protectionism

Our analysis so far points to the role of both bilateral trade imbalances as determinants of protectionist actions. In the case of bilateral imbalances, the introduction of both dyadic fixed effects and country × year fixed effects reduces the concern of unobserved or omitted variables that could cause both trade imbalances and protectionist policies. Another concern is that trade policies could themselves affect trade imbalances even if the use of lagged trade imbalances reduces the reverse causality issue. It is possible that tariffs reduce both bilateral and multilateral imbalances (see for example (Boz et al., 2018)). In this case, our estimated coefficient would be biased downward.[14] The reverse causality problem could go in the opposite direction if for example the announcement of a future tariff hike prompts firms to increase imports to avoid the tariff. In this case, the coefficients we estimated may be biased upward. For the Trump tariffs (Fajgelbaum et al., 2020) find evidence that tariffs did lead a to a fall in imports but no anticipatory effects implying that importers did not shift purchases forward.

A response to these endogeneity concerns, is the use of an instrumental variable for trade imbalances. Based on the "twin deficit" mechanism we use fiscal shocks as an instrument for trade imbalances. In so doing, we also uncover an important and, to our knowledge, new result on the role of fiscal policies in the rise of protectionism. The result that fiscal policy affects trade imbalances is of course not new. It can be generated by the traditional Mundell-Fleming model or the New Open Economy Macroeconomics models. Empirically, (Monacelli and Perotti, 2010) find for example, using a VAR methodology, that for OECD countries a government spending shock leads to a deterioration of the trade balance. This is also the case (Bluedorn and Leigh, 2011) who find that that a 1 percent of GDP fiscal consolidation raises the current account balance-to-GDP ratio by about 0.6 percentage points in OECD countries. Recent papers by (Bussiere et al., 2010), (Corsetti and Müller, 2014), (Chinn and Ito, 2022) also confirm the role of fiscal policies in trade imbalances. The IMF (see World Economic Outlook ((IMF, 2020b) and (IMF, 2020a)) has also pointed to the tight fiscal policy in Germany as a contributor to its large trade surplus after 2000 or to the expansionary fiscal stance of the US as a factor of its trade deficit.

We construct a fiscal shock following the literature on fiscal multipliers in a cross-country setting because the empirical strategy of this literature is also to identify an exogenous fiscal shock. Hence, we follow (Auerbach and Gorodnichenko, 2013a), (Auerbach and Gorodnichenko, 2013b) and (Furceri and Zdzienicka, 2020), and use the forecast error of government expenditures for year $t-1$ as a measure of the exogenous fiscal shock. The forecast errors are taken from the

[14] This simulateneity bias is at the core of the paper by (Trefler, 1993) although the focus is reversed here since we are interested by the true effect of imports on trade policies. As mentioned in section 1.1, the author finds that import protection have a much bigger effect once this simulateneity bias is dealt with.

World Economic Outlook of the IMF. More precisely, the instrument for the trade balance in year $t-1$ in percentage of the Gross Tradable output (GTO) is the forecast error of government expenditures in percentage of GDP for year $t-1$, i.e the difference between the actual growth rate of government spending over GDP at time $t-1$ (as given in the World Economic Outlook at time t) and the IMF forecast of the growth rate for time $t-1$ made at time $t-2$. Data is available only starting in 2013 so we loose some observations. Compared to a simple measure of spending, this instrument reflects the unexpected additional spending scaled by GDP.

Our fiscal shock cannot be used as an instrument for both bilateral and multilateral trade variables in the same regression. We will see that our fiscal shock instrument is stronger for multilateral than for bilateral trade balances. Also, the endogeneity concern is more severe for the multilateral trade balance (as we cannot include country-year fixed effects in this case). For these reasons, we believe our instrumental variable strategy is better fit for the multilateral trade balance. In table 1.4, the first regression shows the non instrumented regression with both bilateral and multilateral trade balances and with country pair fixed effects. They both have the expected negative and significant coefficient in this sample.

Regression (2) shows the first stage: an unexpected positive shock on government spending measured by the forecast error ($FE^{G/GDP}_{h,t-1}$) is a strong predictor of a deterioration of the trade balance. Note that the first stage also controls for Gross Tradable Output (GTO) in year $t-1$ which further removes some of the cyclical component of the fiscal shock. Column (3) presents the second stage results. We use the control function approach as first proposed for count data by (Wooldridge, 1997). The residual of the first stage (with a hat in table 1.4) is directly included in the Poisson regression of the second stage together with the instrumented variable.[15] As opposed to a classic 2SLS estimation, the control function approach allows us to keep the PPML estimation for the count data variable that is the number of protectionist attacks. The second stage result shows that an improvement of the multilateral trade balance instrumented by a fiscal shock leads to more protectionist interventions. Note that the coefficient on the bilateral trade imbalance remains significant and negative.

In column (4), we test the reduced form: we find that a fiscal expansion measured by an unexpected increase in government expenditures increases the number of protectionist interventions. We think that this result itself, which to the best of our knowledge is original, is interesting in itself. The impact of an unexpected fiscal expansion on protectionist tension is also economically significant: for example, if a G20 government increases its expenditures to GDP ratio from 40% to

[15]Compared to the IV-Poisson specification, control functions allow for a large number of fixed effects which is our case here given the dyadic fixed effects.

42%[16] (whereas the IMF expected no change) our estimates predicts that it would increase trade attacks the following year by 9.4%.

Table 1.4: Multilateral trade balances (IV)

	(1)	(2)	(3)	(4)
	Nb $att_{h,i}$	Multi. $TB/GTO_{h(t-1)}$	Nb $att_{h,i}$	Nb $att_{h,i}$
Bilat. $TB/GTO_{hi(t-1)}$	-12.39***	0.589*	-25.63***	-8.700*
	(-3.00)	(1.80)	(-4.06)	(-1.89)
Multi. $TB/GTO_{h(t-1)}$	-6.320***		-41.30***	
	(-3.32)		(-3.65)	
$attacks_{ih,(t-1)}$	0.00170	-0.000147	-0.00317	0.00200
	(0.17)	(-1.03)	(-0.30)	(0.19)
$(Import \times Export)^{\frac{1}{2}}_{hi(t-1)}$	0.00869	-0.000342*	-0.00453	0.00823
	(0.94)	(-1.89)	(-0.46)	(0.86)
1 = RTA (source: WTO)	-0.348**	-0.00104	-0.388**	-0.372**
	(-2.02)	(-0.30)	(-2.24)	(-2.22)
$RER_{ih(t-1)}$	0.000530***	-0.00000548***	0.000369***	0.000607***
	(4.99)	(-3.92)	(3.12)	(5.66)
$GTO_{i(t-1)}$	-0.0854	0.000624	-0.0564	-0.0742
	(-1.45)	(0.37)	(-0.98)	(-1.37)
$GTO_{h(t-1)}$	-0.255***	0.00294***	-0.165***	-0.305***
	(-6.08)	(4.02)	(-2.78)	(-6.69)
1==populist gov. *at*	0.461***	0.000625	0.467***	0.423***
	(4.34)	(0.29)	(4.56)	(4.06)
$FE^{G/GDP}_{h,t-1}$		-0.0406***		1.710***
		(-5.39)		(3.72)
$\widehat{\text{resid multi}}$			35.76***	
			(3.27)	
Year-FE	Yes	Yes	Yes	Yes
Dyad-FE	Yes	Yes	Yes	Yes
Country X Year-FE	No	No	No	No
F-stat		29.1		
Model	PPML	1SLS	2 step - Control function	Reduced form
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	2,142	2,142	2,142	2,142

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : Except for column (3), the dependent variable is the number of trade attacks of attacking country h toward affected country i and regression are estimated with PPML. Column (1) is displays the first step of the control function approach and is estimated in OLS. The second step of the control function (column 4) is a PPML estimation using the residual predicted by the linear 1SLS of column (2). Table 1.14 in appendix present the bootstrapped standard errors, which remain significant. Forecast errors of government expenditures are taken from the World Economic Outlook of the IMF and are only available from 2011 onwards. and GTOs are expressed in trilion USD. Multi. $TB/GTO_{h(t-1)}$ is the multilateral trade balance of country h net of the bilateral trade balance $h - i$.

[16] This corresponds to the within standard deviation of unexpected fiscal shocks in our G20 sample.

In table (1.5), we use our fiscal shock to instrument the bilateral trade balance. In this case, we use the difference in the forecast error of government expenditures for year $t-1$ between the two countries. The gravity model (see equation 1.4) predicts that the increase of bilateral imports of h from i following a positive shock in expenditures of h should depend on the distance between the two countries. For a given domestic fiscal expenditure shock, the impact on bilateral trade should be smaller for more distant countries. This is the reason we weight the difference in forecast error of government expenditures by the log of the distance between the two countries. Regression (1) displays again the non instrumented regression. Column (2) shows the first stage regression of the IV model with dyadic and time fixed effects and where we control for the (non instrumented) multilateral trade balance. Our instrument has the expected sign and is predictive of the bilateral trade balance even though the F-stat is low and only of 6.2 and therefore indicates that this instrument is relatively weak in the bilateral context. Column (3) shows the second stage regression with a coefficient on the instrumented bilateral trade balance which has the right sign and is significant. The effect is however very large and orders of magnitudes higher than our non instrumented estimate (column 1 of the table). Hence, this, together with the fact that our fiscal instrument is weak in the bilateral dimension, leads us to be cautious on the interpretation of this result. This change of order of magnitude between the non instrumented regression and the control function approach may still be rationalized when put in relation with the result found in (Trefler, 1993). He finds that the effect of import protection on imports is 10 times larger when taking into account the endogenous nature of trade policies vis-a-vis the level of import. This suggests that the impact of imports on trade policies may also be underestimated by an order of magnitude due to reverse causality. Finally, column (4) shows the reduced form of the empirical model. It suggests that a distance weighted difference in fiscal stance may be predictive of bilateral protectionist measures chosen by the country with more expansionary fiscal policy.

Table 1.5: Bilateral trade balances (IV)

	(1)	(2)	(3)	(4)
	Nb att$_{h,i}$	Bilat. TB/GTO$_{hi(t-1)}$	Nb att$_{h,i}$	Nb att$_{h,i}$
Bilat. TB/GTO$_{hi(t-1)}$	-12.39***		-129.5**	
	(-3.00)		(-2.09)	
Multi. TB/GTO$_{h(t-1)}$	-6.320***	-0.0234	-8.781***	-5.607***
	(-3.32)	(-0.88)	(-3.54)	(-3.09)
attacks$_{ih,(t-1)}$	0.00170	0.0000790	0.0122	0.00169
	(0.17)	(0.85)	(1.14)	(0.17)
(Import × Export)$^{\frac{1}{2}}_{hi(t-1)}$	0.00869	0.000151	0.0264*	0.00851
	(0.94)	(1.48)	(1.82)	(0.90)
1 = RTA (source: WTO)	-0.348**	-0.00000186	-0.329*	-0.325*
	(-2.02)	(-0.00)	(-1.92)	(-1.91)
$RER_{ih(t-1)}$	0.000530***	0.000000151	0.000565***	0.000550***
	(4.99)	(0.43)	(5.37)	(5.17)
$GTO_{i(t-1)}$	-0.0854	-0.000910	-0.186***	-0.0782
	(-1.45)	(-1.09)	(-2.86)	(-1.36)
$GTO_{h(t-1)}$	-0.255***	-0.000116	-0.274***	-0.263***
	(-6.08)	(-0.62)	(-6.68)	(-6.21)
1==populist gov. *at*	0.461***	-0.000214	0.429***	0.452***
	(4.34)	(-0.45)	(4.19)	(4.30)
$\frac{FE^{G/GDP}_{h(t-1)} - FE^{G/GDP}_{i(t-1)}}{\log(dist_{hi})}$		-0.0410**		5.494**
		(-2.50)		(2.14)
$\widehat{\text{resid bilat}}$			118.0*	
			(1.93)	
Year-FE	Yes	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes
Country X Year-FE	No	Yes	Yes	Yes
F-stat		6.2		
Model	PPML	1SLS	2 step - Control function	Reduced form
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	2,142	2,142	2,142	2,142

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : Except for column (1), the dependent variable is the number of trade attacks of attacking country h toward affected country i and regression are estimated with PPML. Column (1) is displays the first step of the control function approach and is estimated in OLS. The second step of the control function (column 2) is a PPML estimation using the residual predicted by the linear 1SLS of column (1). Table 1.14 in appendix present the bootstrapped standard errors, which remain significant. Forecast errors of government expenditures are taken from the World Economic Outlook of the IMF and are only available from 2011 onwards. and GTOs are expressed in trilion USD. Multi. TB/GTO$_{h(t-1)}$ is the multilateral trade balance of country h net of the bilateral trade balance $h - i$.

1.7. Robustness checks

We conduct several robustness checks on the way we define and measure protectionist interventions, on the estimation method, on the sample as well as on the instrumental variable regression. We first check how our results depend on the definition of protectionist interventions. In table 1.6 we perform the same regression as the second column of table (1.3) (hence with dyad and country × year fixed effects, our preferred specification) but with the four different types of protectionist attacks defined by GTA (see appendix table 1.11 for details on the definition). As we go from type 1 to type 4 attacks, we enlarge the definition of a protectionist attacks from tariff measures only (type 1) to measures that include import quotas and anti-dumping measures (type 2) to technical barriers and public procurement restrictions (type 3) and to export restrictions or migration measures (type 4). Column (1) reproduces for comparison regression (2) of table 1.3 where the coefficients of controls (except attacks from the destination country) are not reported. The loss of significativity when we enlarge our definition of protectionist measures to non tariff barriers indicates that our mechanism mostly goes through tariff measures rather than other types of protectionist intervention.

Table 1.6: Alternative intervention types

	(1)	(2)	(3)	(4)
	Nb $att_{h,i}$	Nb $att_{h,i}$ 2	Nb $att_{h,i}$ 3	Nb $att_{h,i}$ 4
Bilat. $TB/GTO_{hi(t-1)}$	-5.942***	0.223	-2.628	-0.647
	(-2.61)	(0.11)	(-1.35)	(-0.41)
$attacks_{ih,(t-1)}$	-0.00554			
	(-0.85)			
$(\text{Import} \times \text{Export})^{\frac{1}{2}}_{hi(t-1)}$	0.00115			
	(0.39)			
1 = RTA (source: WTO)	0.110	-0.0230	0.0183	0.0159
	(1.03)	(-0.29)	(0.30)	(0.42)
$RER_{ih(t-1)}$	0.000192***	0.0000608*	0.0000506**	0.0000556***
	(3.08)	(1.76)	(2.38)	(2.78)
$attacks_{ih,(t-1)}$ 2		-0.00539		
		(-1.63)		
$attacks_{ih,(t-1)}$ 3			-0.00308*	
			(-1.65)	
$attacks_{ih,(t-1)}$ 4				-0.000230
				(-0.28)
Year-FE	No	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes
Country X Year-FE	Yes	Yes	Yes	Yes
Pseudo R2	0.59	0.58	0.71	0.86
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	3,366	3,366	3,366	3,366

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$. All columns are Poisson Pseudo Maximum Likelihood estimation.

In table (1.7) we present different ways of measuring a protectionist intervention. The measure we use in the regressions presented in the previous section simply counts the number of attacks (defined as tariff increases) that affect a country that exports more than USD 1 million of at least

one HS6 product affected by the change. Our preferred regression using this measure is again replicated in the first column of table (1.7). This measure reflects the political decision of attacking one country, but it does not differentiate the attacks on the basis of the intensity of the measure. In the second column, the alternative measure of a bilateral protectionist attack is the share of imports of country h from country i covered by the tariff increase. This alternative measure of protectionism does not change our results. In column (3) we use a similar variable directly constructed in the GTA database which is the share of trade between two country that is subject to a new protectionist intervention. Our core result again is robust. In column (4), we measure a protectionist attack by the number of products (tariff lines) targeted by the tariff increase. The number of products affected by a intervention is fixed, however the value of the variable we use may differ for different dyads affected by the same intervention. Indeed, if two countries trade less than USD 1 million of one HS6 product, the product will not be counted as attacked. Again, our results are robust to this alternative measure of bilateral protectionist actions that take into account its intensity.

Table 1.7: Alternative measures of protectionism

	(1)	(2)	(3)	(4)
	Nb att$_{h,i}$	Imp. attacked$_{hi,t}$	Share of trade attacked$_{hit}$	Nb. products attacked$_{hi,t}$
Bilat. TB/GTO$_{hi(t-1)}$	-5.942***	-1.530***	-9.051***	-17.02***
	(-2.61)	(-3.45)	(-3.29)	(-4.20)
attacks$_{ih,(t-1)}$	-0.00554	-0.00449	-0.0126	0.0601***
	(-0.85)	(-0.96)	(-1.22)	(4.45)
(Import × Export)$^{\frac{1}{2}}_{hi(t-1)}$	0.00115	-0.00223***	-0.00361	0.00260
	(0.39)	(-4.54)	(-0.54)	(0.55)
1 = RTA (source: WTO)	0.110	0.140***	-0.176	0.169
	(1.03)	(4.17)	(-1.58)	(1.25)
$RER_{ih(t-1)}$	0.000192***	-0.0000224	-0.000130	0.000119
	(3.08)	(-0.75)	(-1.37)	(1.17)
Year-FE	No	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes
Country X Year-FE	Yes	Yes	Yes	Yes
Pseudo R2	0.59	0.90	0.27	0.91
Variant	Intervention	Amount	Amount	Tariff lines (GTA)
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	3,366	3,366	2,930	3,269

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$.

Table 1.8 presents alternative estimation methods to the PPML regression specification used in the paper. In the first three columns, we perform the following estimations: 1) PPML but without any fixed effects, 2) a negative binomial regression and 3) OLS without fixed effects. Our main result on the bilateral trade balance is robust. In columns 4 and 5, we add year and dyad fixed effect to the PPML and OLS regressions respectively. Finally in columns 6 and 7, in addition to country pair fixed effects, country-year fixed effects are added, similar to previous regression models. The sign of the bilateral trade balance remains negative and significant in all regressions. With the addition of the full set of fixed effects, the relationship remains negative but loses significance in the OLS specifications.

Table 1.8: Alternative estimation methods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$
Bilat. $TB/GTO_{hi(t-1)}$	-5.786***	-5.380***	-27.84***	-11.10***	-39.89*	-5.942***	-25.33*
	(-4.37)	(-3.58)	(-5.96)	(-2.66)	(-1.92)	(-2.61)	(-1.74)
$attacks_{ih,(t-1)}$	0.00195	-0.00185	0.00338	-0.000696	0.00546	-0.00554	-0.0518*
	(0.33)	(-0.36)	(0.20)	(-0.09)	(0.20)	(-0.85)	(-1.94)
$(\text{Import} \times \text{Export})^{\frac{1}{2}}_{hi(t-1)}$	0.00317***	0.00229***	0.0164***	0.0166***	0.0814***	0.00115	0.0323*
	(4.89)	(3.15)	(6.71)	(3.38)	(2.77)	(0.39)	(1.67)
1 = RTA (source: WTO)	-0.306***	-0.295***	-0.695***	-0.167	-0.319	0.110	0.122
	(-5.27)	(-6.16)	(-4.56)	(-1.37)	(-1.16)	(1.03)	(0.46)
$RER_{ih(t-1)}$	-0.000155***	-0.000111***	-0.000244***	0.000536***	0.000827***	0.000192***	0.000231*
	(-7.19)	(-8.24)	(-6.83)	(10.65)	(4.13)	(3.08)	(1.81)
$GTO_{i(t-1)}$	0.0318***	0.0412***	0.114***	-0.0423*	-0.271		
	(4.78)	(6.48)	(5.28)	(-1.96)	(-1.48)		
$GTO_{h(t-1)}$	0.0138**	0.0109	0.0224	-0.0171	-0.134*		
	(2.48)	(1.57)	(1.04)	(-1.10)	(-1.86)		
1==populist gov. *at*	0.797***	0.730***	2.512***	0.757***	2.743***		
	(12.84)	(14.98)	(15.18)	(6.97)	(4.98)		
Year-FE	No	No	No	Yes	Yes	No	No
Dyad-FE	No	No	No	Yes	Yes	Yes	Yes
Country X Year-FE	No	No	No	No	No	Yes	Yes
Model	PPML	Neg Bin	OLS	PPML-dyad FE	OLS-dyad FE	PPML-3WFE	OLS-3WFE
Pseudo R2	0.11	0.06		0.43		0.53	
R2 (within)					0.10		0.01
Cluster	No	No	No	Dyad	Dyad	Dyad	Dyad
Observations	3,234	3,366	3,366	3,366	3,366	2,948	3,366

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$.

In Table 1.9, we test how the impact of bilateral imbalances differs across periods and samples of countries. Again, our preferred specification (regression (2) of table (1.3) with country × year and dyadic fixed effects) serves as the point of comparison and is reproduced in column 1. In regression (2) and (3), we restrict the sample to dyads including the US either as an attacker or an attacked country (and where the other country is in the G20). These regressions cannot not include country × year fixed and therefore have year fixed effects instead. In column (2) we focus on the 2009-2016 pre-Trump period and find a large and negative but insignificant coefficient on the bilateral trade balance. Column (3) restricts the period to 2017-2019, the Trump presidency years. During the Trump years, the impact of the bilateral trade balance as a predictor of protectionist measures is twice larger than before Trump. Column (4) excludes the USA of the sample. The coefficient is somewhat reduced compared to the full sample including the US but remains significant. Hence, we conclude that our results are not driven by the US or the Trump presidency but they are stronger during the Trump presidency. Excluding China (column 5) or the EU (column 6) increases the coefficient on bilateral trade but the results are robust to this change of sample. This is important because the China tense relation with its trade partners (especially the US) has been most salient in the news but is not at the source of our main result.

Table 1.9: Alternative samples

	(1)	(2)	(3)	(4)	(5)	(6)
	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$
Bilat. $TB/GTO_{hi(t-1)}$	-5.942***	-24.61	-56.76***	-4.173**	-7.446**	-9.420**
	(-2.61)	(-1.30)	(-2.92)	(-1.98)	(-2.55)	(-2.49)
$attacks_{ih,(t-1)}$	-0.00554	-0.0305*	0.0320***	-0.00194	-0.00193	0.00288
	(-0.85)	(-1.83)	(3.09)	(-0.28)	(-0.30)	(0.43)
$(\text{Import} \times \text{Export})^{\frac{1}{2}}_{hi(t-1)}$	0.00115	0.00173	-0.000194	-0.00308	-0.00143	-0.000882
	(0.39)	(0.37)	(-0.04)	(-0.94)	(-0.43)	(-0.24)
1 = RTA (source: WTO)	0.110	0.0711	-0.179	0.152*	0.103	0.346**
	(1.03)	(0.41)	(-1.01)	(1.69)	(0.96)	(2.47)
$RER_{ih(t-1)}$	0.000192***	-0.000111	0.00705**	0.000182***	0.000193***	0.0000812
	(3.08)	(-0.79)	(2.34)	(3.08)	(2.95)	(0.55)
$GTO_{i(t-1)}$		-0.0305	-0.0165			
		(-0.40)	(-0.31)			
$GTO_{h(t-1)}$		-0.0231	0.0241			
		(-0.18)	(0.07)			
1==populist gov. *at*		0.659***	-0.494***			
		(2.80)	(-2.84)			
Year-FE	No	Yes	Yes	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes	Yes	Yes
Country X Year-FE	Yes	No	No	Yes	Yes	Yes
Pseudo R2	0.53	0.62	0.62	0.48	0.51	0.59
Sample	All G20	USA 2009-16	USA 2017-19	W/o USA	W/o CHN	W/o EU
Cluster	dyad	dyad	dyad	dyad	dyad	dyad
Observations	2,948	1,199	1,014	2,778	2,778	1,794

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : The dependent variable is the number of trade attacks of attacking country h toward affected country i at year t. GTOs are expressed in trilion USD. Bilat $TB_{hi(t-1)}$ is the bilateral trade balance of country h with respect to i at $t-1$. All columns are Poisson Pseudo Maximum Likelihood estimation.

Finally, we test in table (1.10) whether our IV strategy is robust to the inclusion of forecast errors of GDP. This allows to control for the part of the variation of the instrument that comes from forecast errors in GDP to the part that comes from the forecast errors in government spending. Regression (1) includes in the non instrumented trade balance variables regressions the forecast errors of GDP of country h ($FE^{GDP}_{h,t-1}$). In the remaining regressions we reproduce the first and second stage regressions of tables (1.5) and (1.4) and again include the forecast errors of the GDP for country h (and country i for the bilateral regressions). For multilateral trade balances the

results are robust. For the bilateral case, the results are comparable but the instrumented bilateral trade balance looses significance which confirms that we should take the instrumental strategy for the bilateral variable with caution.

Table 1.10: IV robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
	Nb $att_{h,i}$	Multi. TB/$GTO_{h(t-1)}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Bilat. TB/$GTO_{hi(t-1)}$	Nb $att_{h,i}$
Bilat. TB/$GTO_{hi(t-1)}$	-11.06**	-0.466	-27.62***	-11.00**		-111.0
	(-2.44)	(-1.40)	(-3.45)	(-2.41)		(-1.61)
Multi. TB/$GTO_{h(t-1)}$	-6.112***		-43.34***	-6.103***	-0.0272	-8.635***
	(-3.26)		(-3.26)	(-3.25)	(-0.94)	(-3.08)
$FE^{GDP}_{h,t-1}$	-0.754***	0.0201***	0.149	-0.743***	0.00214*	-0.486**
	(-4.52)	(4.13)	(0.46)	(-4.48)	(1.92)	(-2.15)
$FE^{G/GDP}_{h,t-1}$		-0.0341***				
		(-4.50)				
$\widehat{\text{resid multi}}$			37.86***			
			(2.93)			
$FE^{GDP}_{i,t-1}$				0.198	-0.000436	0.123
				(0.98)	(-0.52)	(0.59)
$\frac{FE^{G/GDP}_{h(t-1)} - FE^{G/GDP}_{i(t-1)}}{\log(dist_{hi})}$					-0.0369**	
					(-2.15)	
$\widehat{\text{resid bilat}}$						100.6
						(1.48)
Year-FE	Yes	Yes	Yes	No	No	No
Dyad-FE	Yes	Yes	Yes	Yes	Yes	Yes
Country X Year-FE	No	No	No	Yes	Yes	Yes
F-stat		20.2			4.6	
Model	PPML mutlilat.	1SLS multilat.	2SCF multilat.	PPML bilat.	1SLS bilat	2SCF bilat.
Controls	Yes	Yes		Yes	Yes	Yes
Cluster	Dyad	Dyad	Dyad	Dyad	Dyad	Dyad
Observations	2,142	2,142	2,142	2,142	2,142	2,142

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note : For first stage regressions (column (1) and (4)), the dependent variable is bilateral and multilateral trade balance as a share of GTO respectively. The first stages are estimated in OLS. For second stages (control function approach), the dependent variable is the number of trade attacks of attacking country h toward affected country i and these regressions are estimated with PPML. The second stage of the control function (column (2) and (5)) is a PPML estimation using the residual predicted by the linear 1SLS (column (1) and (4) respectively). Forecast errors of government expenditures are taken from the World Economic Outlook of the IMF and are only available from 2011 onwards. All regression control for both countries' GTO (expressed in billion USD), the presence of populist government in country h, the signature of the trade agreement between i and h at time t, bilateral real exchange rate movement as well as past symmetrical attack to control for the retaliatory motive. Coefficient of these control variable are not displayed for clarity.

1.8. Conclusion

Trade imbalances are predictive of protectionist tensions. This relation is implicit in policy and media debates but, to our knowledge, our paper is the first empirical analysis that attempts to identify and quantify a causal impact of the role of trade imbalances on protectionism at the bilateral level. Our paper does not have any direct normative implication but it suggests that if globalization, both in its trade and financial dimension, has generated more bilateral and multilateral trade imbalances, then it may also generate protectionist forces that may endogenously put a brake to globalization. Trade imbalances are also often discussed as a source of concern because of their macroeconomic consequences in particular in terms of either foreign debt accumulation or demand deficit. Our results suggest that they have a further potential negative impact in aggravating trade tensions. Another implication of our results is that the lack of concern by economists on bilateral trade imbalances may be misguided. Bilateral trade imbalances (especially in the presence of global value chains) may not be indicative of real distortions that trade policies could or should address. However, our results suggest that the existence of bilateral trade imbalances may generate protectionist tensions with real distortions. Finally, international cooperation in macroeconomic policies (especially fiscal policies) has been viewed as important to reduce the possibility of a free-rider problem where countries with more restrictive fiscal policies (and larger trade surpluses) reduce global demand but benefit from other countries expansionary fiscal policies. This is for example a criticism addressed towards some EU countries by the US administrations and one interpretation of our analysis is that the issue will not disappear with the end of the Trump presidency. Our results suggest indeed that countries that act as "consumers" of last resort through expansionary fiscal policies and incur trade deficits as a consequence do retaliate via protectionist actions. This also suggest that the Biden unprecedented fiscal stimulus (and much larger than any other G20 country) and the US trade imbalances it may generate may reignite protectionist retaliations. Whether these retaliations are effective or not to alter the macroeconomic policy of targeted countries is a question we leave for further study.

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1.9. Appendices

Appendix

Appendix A.1. Data

Table 1.11: Classification of protectionist intervention based on Global Trade Alert

	type I	type II	type III	type IV
Tariff measures	✓	✓	✓	✓
Import monitoring		✓	✓	✓
Anti-dumping		✓	✓	✓
Anti-circumvention		✓	✓	✓
(Special) safeguard		✓	✓	✓
Local content measures		✓	✓	✓
Import quotas		✓	✓	✓
Import ban		✓	✓	✓
Import tariff quotas		✓	✓	✓
Import licensing requirement			✓	✓
(Phyto)sanitary measures			✓	✓
Technical barrier to trade			✓	✓
Anti-subsidy			✓	✓
Export subsidies or credits			✓	✓
Export related non-tariff measure			✓	✓
Public procurement access			✓	✓
Public procurement preference margin			✓	✓
Public procurement localisation			✓	✓
Capital control measures				✓
Internal taxation of imports				✓
FDI related restrictions				✓
Other subsidies				✓
Migration measures				✓
Intellectual Property				✓
Export restrictions				✓

Table 1.12: Description of variables

Variable name _tex	Description	Source	Mean	p50	sd	Min	Max
$GTO_{k(t-1)}$	Gross Tradable Output	Head and Mayer (2020)	2,138.65	1,030.60	3,453.69	196.07	18,359.61
$RER_{ih(t-1)}$	$h-i$ real exchange rate at $t-1$	World Bank, WDI (CPI and exchange rate)	342.06	1.00	1,782.82	0.00	18,724.55
Common Language (not shown)	h and i share common language	CEPII (gravity database)	0.10	0.00	0.31	0.00	1.00
Contiguity (not shown)	h and i share border	CEPII (gravity database)	0.04	0.00	0.20	0.00	1.00
$EU_h == 1$ & $EU_i == 1$ (not shown)	h and i in EU at time	CEPII (gravity database)	0.05	0.00	0.22	0.00	1.00
$FE^{G/GDP}_{k,t-1}$	Forecast error in government spending (share of GDP)	World Economic Outlook	0.01	0.00	0.05	-0.21	0.19
$\text{attacks}_{ih(t-1)}$	Lagged $(t-1)$ symmetrical attacks (i to h)	Global Trade Alert	2.27	1.00	3.78	0.00	49.00
$\ln(\text{distance}_{hi})$ (not shown)	log of distance between h and i	CEPII (gravity database)	8.80	9.08	0.90	5.04	9.86
1==populist gov. h at t	1== populist government in h at time t	CEPII (gravity database)	0.20	0.00	0.40	0.00	1.00
$1 == \text{RTA}_{hit}$	Presence of h-i trade deal at time t	CEPII (gravity database)	0.31	0.00	0.46	0.00	1.00
Bilat. $\text{TB/GTO}_{hi(t-1)}$	$h-i$ trade balance in goods (share of GTO)	BACI	-0.00	-0.00	0.02	-0.10	0.20
Total. $\text{TB/GTO}_{k(t-1)}$	Multilateral trade balance (share of GTO)	IMF (BOP)	-0.01	0.00	0.08	-0.25	0.18

Appendix A.2. "Proportional trade balance" Cunat-Zymek (2023)

In this table we use the notion of "proportional trade balance" : $\frac{(Import-Export)_{hi(t-1)}}{\sqrt{(Import*Export)}_{hi(t-1)}}$ from Cunat and Zymek (2023). We use the same set of control variables for each specification as in the main paper, only varying the removal/addition of the $\sqrt{(Import * Export)}_{hi(t-1)}$ term.

Table 1.13: Proportional trade balance Cunat-Zymek (2023)

	(1)	(2)	(3)	(4)
	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$	Nb $att_{h,i}$
$\frac{(Import-Export)_{hi(t-1)}}{\sqrt{(Import*Export)}_{hi(t-1)}}$	-0.0699***	-0.0700***	-0.0995***	-0.0935***
	(-3.45)	(-3.46)	(-2.89)	(-2.74)
$\sqrt{(Import * Export)}_{hi(t-1)}$		0.00309***		0.0149***
		(3.23)		(3.18)
Year-FE	Yes	Yes	Yes	Yes
Dyad-FE	No	No	Yes	Yes
Pseudo R2	0.36	0.36	0.40	0.40
Cluster	Dyad	Dyad	Dyad	Dyad
Observations	13,860	13,860	8,976	8,976

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix A.3. Bootstrapping

Following the control function approach introduced to count models by Wooldridge (1997), we bootstrap the standard errors of the second stage of the control function approach. The table below present the estimates without bootstraping of the standard errors presented in table 1.4 & 1.5 for the two control function regressions (regression (3) of both table) followed by their bootstraped equivalent. The number of repetition is 1000.

Table 1.14: Control function estimation with robust standard errors

	Observed coef.	Bias	Std. Err.	[95% conf.	interval]	Repetitions
Control function (multilat)	-41.6048		11.0336	-63.23029	-19.97937	1
Bootstrap - normal CI (multilat)	-41.6048	-2.3996	14.5194	-70.06237	-13.14729	1000
Bootstrap - percentile CI (multilat)			1.308818	-77.60811	-20.67283	1000
Bootstrap - bias-corrected CI (multilat)				-72.89896	-18.93197	1000
Control function (bilat)	-130.8335		61.59824	-251.5638	-10.10312	1
Bootstrap - normal CI (bilat)	-130.8335	-27.05502	124.00497	-373.8787	112.2118	1000
Bootstrap - percentile CI (bilat)				-417.1469	-10.53545	1000
Bootstrap - bias-corrected CI (bilat)				-389.4873	-.6151733	1000

2

Productivity Slowdown and Tax Havens: where is measured value creation?

Abstract

Based on French firm-level data, we evaluate the contribution of the micro-level profit-shifting –through tax haven foreign direct investments– to the aggregate productivity slowdown measured in France. We show that firm measured productivity in France declines over the years following the establishment in a tax haven, with an average estimated drop by 3.5% in apparent labor productivity. To isolate the contribution of multinational enterprises' (MNEs) tax optimization to the decline in productivity, we then exploit the 2006 Cadbury-Schweppes decision of the European Court of Justice limiting the extent to which member States can counter European MNEs' tax planning strategies. We find that multinational groups benefiting from that loosening of the legal constraints do exhibit a lower labor productivity following that ruling. Finally, given these firms' weight, our results imply an annual loss of 5.7% in terms of the aggregate annual labor productivity growth.

2.1. Introduction

Tax avoidance puts a strain on public finances and undermines the consent to taxation. It has logically been subject to a growing interest both in the political and the academic sphere. A less obvious consequence of profit shifting is that it also alters economic measurement and ultimately the quality of public policies. In the midst of the Covid crisis in April 2020, Bruno Le Maire, the French ministry of Finance, announced that multinational firms with a presence in a tax haven and without substantial economic activity in these jurisdictions would not benefit from the State's financial support. Echoing scholars' views, this announcement was primarily made for fairness concerns.[1] Yet, conditioning public subsidies to economic transparency also finds an economic justification given the bias in the measurement of domestic economic activity introduced by tax-planning strategies in tax havens as this paper shows.

[1] See, for instance, (Laffitte et al., 2020)

Productivity slowdown has been a major concern in many advanced countries over the past decade. Some economists argue that we have been facing a demand driven secular stagnation which is characterized by low investment ((Summers, 2014)). Others have, instead, argued that we face a supply-driven secular stagnation, explained by the maturity of the IT revolution and the secular decline in the rhythm of technological progress due to the declining productivity of research workers ((Gordon et al., 2016)). Yet, some others argue that it is mainly driven by mismeasurement issues according to which current national account systems fail to take a proper account of intangible capital, product quality changes, creative destruction or even new "self-service" activities enabled by the digitalization of the economy, all of which underestimate productivity growth ((Aghion et al., 2018), (Haskel and Westlake, 2018) and (Bean, 2016)). These explanations are not necessarily mutually exclusive and all may contribute to explaining the aggregate productivity decline.

In turn, aggregate productivity growth is closely related to productivity at the firm level. When firms become more efficient in transforming inputs into outputs, they contribute to overall efficiency gains. But how exactly do we measure productivity? And what role may international intra-group transfer of assets play in the measurement of firm productivity, and in the end, of GDP? Productivity measures are based, among others, on firm sales (both domestic sales and exports) and when a firm owns an affiliate in a foreign country, its sales abroad are not registered as part of the parent's sales. Neither are they accounted for in the parent's productivity, nor in the home country GDP. Although it makes sense to measure productivity in this way as long as the foreign affiliate produces abroad, it may not always be the case that production takes place abroad. Additionally, multinational enterprises (MNEs) are usually very big firms whose market shares are typically important enough to have an impact in the aggregate economy of a country. Thus, well measuring the activity of MNEs and understanding how tax havens distort national accounting is crucial when assessing countries' productivity.

To illustrate this, let us consider the hypothetical case of a French firm selling its products through a digital platform, for instance, providing services of big data analysis. The firm's research and development activities (R&D) required to develop its products are made in France, where it also pays its workers. When a customer in Germany buys the firm's services through the platform, the firm's sales are collected there where the firm has registered its property rights. In this case,

it will be considered an export from France to Germany and it will contribute to the French GDP. However, if the firm, subject to a statutory corporate tax rate of 25%, decides to develop a global tax strategy by investing say in Ireland in order to move its intellectual property rights to a lower tax jurisdiction, its profits would instead be subject to a 12.5% tax rate. In this case, the transaction of these services would now be considered as an export from Ireland to Germany and the firm in France would see its sales – and productivity– go down. At the same time, its affiliate in Ireland would see its sales and productivity rise, even though the affiliate was not involved at any stage in the production process. Hence, the implication of the tax-motivated income shifting within multinational firms – or "base erosion and profit-shifting" (BEPS) is that activity in high-tax countries is underestimated while it is overestimated in low-tax jurisdictions.

Indeed, there is growing evidence showing that with the deeper international financial integration process that we have observed in the past decades, complex structures of MNEs aiming at reducing their tax bills, significantly distort official production statistics. Furthermore, there has been a deep transformation of the economy, with the digitalization of activities pushing firms to invest more in intangibles to the detriment of tangibles (e.g. Uber or Airbnb virtually don't own cars or buildings, respectively). This has resulted in a steady rise in the importance of intangible investment relative to tangible investment over the past 20 years, which, in major advanced countries, has overtaken tangible investment GDP share around the 2008 crisis.[2] Although techniques to reduce tax payments within MNEs have been around for long, decoupling capital location from production and value location (e.g. intellectual property rights) and transfer-pricing (i.e. absence of "arm's-length prices" for intangibles) has become much easier with the rapid rise of intangible capital. Thus, beyond the deep financial integration that we have observed over the past decades, in a context of international tax competition, the increasing intangible economy has provided new tools for MNEs to offshore their profits to low tax countries.[3]

Beyond measurement issues, which have long been a topic of academic debate and a concern for statistical offices, the social and political implications of tax evasion by MNEs have increasingly attracted public attention and led to the BEPS framework. This is a multi-year initiative of the OECD [Organization for Economic Cooperation and Development] and the G20, launched in 2012, to address the global fiscal challenges of economic digitization in order to prevent base

[2](Haskel and Westlake, 2018).

[3]For instance, the global average statutory corporate tax rate has fallen from 49 percent to 23 percent between 1985 and 2019 ((Clausing et al., 2020)).

erosion. Indeed, the growing discontent with globalization has crystallized in the aftermath of the Great Recession, and the perception that it has widened inequalities between elites - who benefit greatly from it - and the rest of society - who faces increasing pressure from international competition - has intensified with recent scandals such as LuxLeaks and Panama Papers. In a context where globalization is increasingly perceived as an unfair process in which the equality of individuals and companies is trampled before taxation, public discontent towards tax optimization intensifies with every crisis episode. Interestingly, one of the first claims of the civil society with respect to the reforms of international taxation was the implementation of a public database shedding light country by country on the economic activity and corresponding taxes paid by MNEs. This demand - which laid the foundation of the Country-by-Country reporting (CbCR) eventually implemented by the OECD - was not directly motivated by potential biases in the official statistics but mainly to improve the transparency on the tax paid by MNEs. The opacity and the measurement issues associated with the offshore world therefore appear to go hand in hand, raising the need for both political reforms and economic transparency.[4]

This paper relates to the latter. Its aim boils down to a study of the relationship between micro-level tax avoidance, firm productivity mismeasurement and domestic aggregate productivity slowdown for the case of France. Beyond the novelty of the French case, we propose a new methodology. To the best of our knowledge, this paper is the first to quantify macroeconomic mismeasurement linked to profit-shifting based on micro-econometric estimations and without relying on assumption on the production function. In order to correct activities of US MNEs (Guvenen et al., 2022) use an apportionment formula while (Tørsløv et al., 2022) rely on the excess profitability of foreign affiliates compared to domestic firms to correct various indicators. Instead of resorting to a "normal" production function for MNEs, the adjustment technique used in this paper does not rely on proxies but on systematic deviations of firms' apparent productivity associated with the presence of MNEs in tax havens. Our identification strategy is validated by the use of the exogenous shock of the Court of Justice of the European Union (CJE) and has the virtue of relaxing assumptions on firms' production function. Finally, we make use of simple aggregation techniques, standard in the industrial organization literature, to construct a counterfactual aggregate productivity if MNEs had not been present in tax havens over the sample period.

More precisely, we evaluate the contribution of the micro-level tax optimization to the aggre-

[4]This point was first made by Richard Murphy and the Tax Justice Network in 2003.

gate productivity slowdown using balance-sheet yearly data on the universe of French firms and their presence in foreign countries over 1997-2015. Next, we aim at linking the firm-level productivity effect of offshore profit-shifting to the aggregate decline in measured productivity growth in France over the sample period. We identify offshore profit-shifting from within-firm variation in presence in tax havens, exploiting the precise establishment of firms' new foreign presence in a tax or non-tax haven country. Additionally, given that productivity may be mean-reverting, our regressions include initial productivity interacted with firms' trends, following (Fons-Rosen et al., 2021). Thus, we control for any productivity decline due to high initial productivity, since this decline is not captured by the firm fixed effects or the sector-year effects.[5] Furthermore, we evaluate the dynamic effects by asking whether the productivity differential for firms with presence in tax havens evolves over time after the entry in a tax haven and checking that the pre-trends do not exhibit specific patterns. Noting that firms self-select in tax havens, the entry in tax havens cannot be seen as purely exogenous and it could itself be linked to strategic decisions influencing firms' productivity. Even if our estimates are likely to be biased toward zero, providing, therefore, a lower bound of the true productivity mismeasurement, we reinforce the identification of the contribution of profit-shifting to the productivity measure by exploiting the 2006 Cadbury-Schweppes decision of the European Court of Justice.[6] This decision restricts the application of Controlled-Foreign Company by member States and therefore loosens legal constraints for European MNEs with a presence in a European tax haven before 2006, which we observe in our dataset.[7] Once we establish the link between profit-shifting and mismeasurement of productivity, we then explore two different channels: (i) the mediating role of intangible capital by splitting our sample between firms with high and low intensity in intangible capital and (ii) whether the mediating effect is opening an affiliate in a tax haven or having tax haven parent. Last but not least, we provide a macro-economic quantification of the productivity slowdown due to profit-shifting based on our micro-econometric estimates by relying on standard firm productivity aggregations, which allows us constructing an aggregate productivity counterfactual.

[5]This is important as not controlling for the tendency of high productivity firms to experience a productivity decline over time would result in a negative omitted variable bias, which could overstate the negative effect of offshore profit-shifting as high productivity firms have higher incentives to invest in tax havens.

[6]The reason why we argue that our estimates might be suffering from a bias toward zero is that the most likely source of endogeneity in our analysis is related to a reverse causality which generates an attenuation bias as the effect of productivity on the decision of establishing in a tax haven is positive and this effect is captured by the coefficient of interest, which is negative and significant. In the absence of a reverse causality, the coefficient should be more negative as it wouldn't capture the positive effect of the regressed variable on the regressor.

[7]The Controlled-Foreign Company (CFC) rules aimed at ensuring that offshore entities owned by a resident firm do not result in an absence of taxation from the point of view of the parent jurisdiction. The definition of ownership and of the economic activity covered by CFC rules vary across countries. The implementation of efficient CFC rules is at the core of the OECD BEPS programs (see in particular action 3 of the program).

Our findings suggest that firm productivity in France experiences a decline over the immediate years following an establishment in a tax haven, with an average estimated drop around 3.5% in labor productivity depending on the list of tax haven used and 1% in total factor productivity. We argue that this productivity decline, following a presence in a tax haven, is most likely explained by MNEs' fiscal optimization, where domestic productivity is underestimated as profits are not recorded anymore in the home country. Additionally, we find that the mismeasurement has strong dynamic effects, as the decline becomes more important the longer the firm remains in a tax haven. For instance, we find that after 10 years of presence in a tax haven, ALP attains an average 11.7% drop with respect to the years before the tax haven presence, while the respective impact for TFP is around -4.8%. Finally, our findings are robust to the list of tax haven used and to a placebo test of the "tax haven presence treatment". We are confident that these estimates rightly capture the effect of profit-shifting since the difference-in-difference (DiD) strategy applied around the Cadbury-Schweppes decision gives rise to comparable effects: depending on the specification, the "treated" firms who benefited from the loosening of the applicability of CFC rules experienced a 1 to 2% decline of their productivity measured in France after 2006 other things kept equal. Turning to the aggregate quantification of our results implies that the share of the aggregate loss in the level of labor productivity in France that can be explained by micro-level fiscal optimization of MNEs is equivalent to 6% between 1997 and 2015. This is tantamount to 5.7% of the observed aggregate annual growth in labor productivity over the period.

The rest of the paper is organized as follows. In Section 2.2 we briefly discuss the relevant literature related to our analysis; Section 2.3 describes our data sources and presents some stylized facts; Section 3.4 explains the econometric methodology, reports the empirical findings and tests their robustness; Section 2.5 inspects the underlying mechanisms; Section 2.6 discusses the aggregate implications of micro level offshore profit-shifting and Section 2.7 concludes.

2.2. Related Literature

This section briefly presents a non-exhaustive review of related work and compares the magnitude of our results with previous findings in the literature. First, this paper is related to the literature aiming at explaining the firm productivity developments and how internationalization affects firm performance. In line with the literature, our results suggest that MNEs are both more productive than domestic firms ((Helpman et al., 2004a) and that becoming an MNE is related to

productivity increases ((Arnold and Javorcik, 2009), (Guadalupe et al., 2012), (Criscuolo and Martin, 2009) and (Fons-Rosen et al., 2021)). For comparability on the magnitudes with earlier work, the TFP effect of becoming an MNE in our sample is around 0.38% (and 0.57% for ALP). This number is clearly below that found by (Fons-Rosen et al., 2021), where the TFP effect of a new foreign acquisition of a domestic firm is on average 2%. Nonetheless, the effect remains well above other estimates in the literature on foreign acquisitions, where no effect is found upon inclusion of firm fixed effects. For instance (Arnold and Javorcik, 2009) find a 13% increase in productivity after 3 years of foreign acquisition in Indonesia and (Criscuolo and Martin, 2009) find a 4% productivity increase for firms in UK when acquired by American firms and 1% for the rest of acquisitions in the UK. While (Smarzynska Javorcik, 2004), (Liu, 2008), (Balsvik and Haller, 2010) and (Aitken and Harrison, 1999) find no effect. However, beyond the different time span and country idiosyncrasies, our estimates, by construction, capture situations reflecting all types of MNE status (new foreign affiliates in France, foreign acquisitions of domestic French firms, French domestic firms acquiring or opening a new affiliate in a foreign country) and not specifically the effect of foreign acquisitions.

Our paper is also linked to the literature evaluating the productivity slowdown in advanced economies. In particular, a strand of the literature focuses on measurement issues in the context of an increasingly digitalized and highly global integrated economy, which is the direction that we take in this paper. Robert Solow's famous productivity paradox in the 80's, that one "can see the computer age everywhere but in the productivity statistics" is still relevant today as the technological revolution has curiously been accompanied by a productivity growth slowdown in advanced economies. Productivity and real GDP measurement are closely related and some challenges arising from the digitization of the economy have been identified. For instance, underestimation of real output and, hence, productivity can be the result of overstated deflators for ICT products. In this sense, (Aghion et al., 2018) claim that not accounting for increases in quality -which has rapidly grown with the rise of ICT and globalization- for new products replacing old products results in an overstated inflation which understates growth. They find that in France the related mismeasurement represents 0.5 percentage point per year of output growth, which is about a third of the "true" productivity growth from 2004 to 2015. For comparison, we argue that the mismeasurement related to MNEs' offshore profit-shifting represents around 6% of the observed average productivity annual growth from 1997 to 2015 in France.

Furthermore, globalization has allowed MNEs' production to be fragmented across different coun-

tries which poses challenges to the definition of production location as it may become an ambiguous concept. Large networks of affiliates together with footloose capital make geographical boundaries an obsolete concept for providing a meaningful insight of production location. This is all the more an issue when relocation choices are motivated by tax reasons, as the reported location of production may often not describe where the production really takes place. The academic literature and statistical offices have extensively documented measurement issues that are related to tax evasion and affect official statistics, such as GDP (and thus, factor shares), and those relating to the external sector statistics such as the balance of payments (BOP) and the international investment position (IIP). For instance, a well known case is that of Ireland, whose GDP annual growth in 2015 was revised from an expected 7.8% to 26%, following some multinationals' relocation of intellectual property rights to Ireland (exports were revised up by 50 billion euro and the net IIP was revised from expected −150 to −532 billion euro). Artificially complex cross-border financial structures, where financial engineering is used to shift profits, to relocate profitable moveable assets or to sell digital services from a location without having a physical presence, inflate GDP and FDI figures in tax havens. In this sense, alternative concepts have been developed in Ireland, in order to assess the purely domestic portion of its economy by excluding factor income of foreign firms redomiciled in its territory and depreciation of relocated assets.

(Lane and Milesi-Ferretti, 2011) document the particularly large size of external balance sheets in small, offshore financial centers, while (Lane and Milesi-Ferretti, 2018) document how the increased complexity of the corporate structure of MNEs explains the continuous expansion of cross-border FDI positions after the 2008 financial crisis, essentially driven by positions vis-à-vis financial centers. This, they argue, makes it very difficult to disentangle "genuine" financial integration and portfolio diversification from complex tax evasion schemes. In order to have a clearer understanding of globalization patterns, recent research by (Damgaard et al., 2019) seeks to identify which economies host what the IMF coined "phantom investments", which are corporate shells with no real activity in the host economy, and their counterparts. They find that phantom FDI may account for almost 40 percent of global FDI and that by allocating real investment to ultimate investors standard gravity variables explanatory power is significantly increased. In the same vein, (Delatte et al., 2022) evaluate FDI and portfolio securities around the world and find that 40% of global assets don't fit gravity estimates, are located in tax havens and are concentrated in only six jurisdictions. (Vicard, 2019) documents how the corporate tax rate correlates with excess returns to international assets, inflating therefore the investment income balance in the BOP. In the case of France, profit-shifting accounts for an average 2 pp differential between

the return to French FDI assets and liabilities. This results in estimated missing profits in France equivalent to 1.6% of GDP in 2015. Moreover, a firm-level analysis conducted on French firms in 1999 uncovers systematic mispricing to related parties located in tax havens (Davies et al., 2018). Interestingly, this study shows that this effect is concentrated among the biggest MNEs, supporting the idea that tax avoidance is a granular phenomenon. (Fisman and Wei, 2004) focus on Chinese data and argue that tax evasion helps explaining differences between reported bilateral imports and exports, where in addition to underreporting the value of imports, higher-taxed category imports are mislabeled to lower-taxed ones. (Tørsløv et al., 2022) document how MNEs are systematically more profitable in low-tax jurisdiction countries than in other places, and they are even much more profitable than domestic firms in low tax countries. Exploiting these tax generated anomalies, they estimate that around 40% of global profits in 2015 are shifted to tax havens and revise official statistics adjusted by profit-shifting. Their proposed database reports adjusted GDP, trade balance and capital shares, which are all underestimated in countries from where profits are shifted away and overestimated for low tax jurisdiction countries. For instance, in the case of the French trade balance in 2015, the trade deficit disappears with a surplus of 0.4% (equivalent to a 1.1 pp difference with the official statistics).

Our contribution is twofold. First, we bring new evidence on the micro-determinants of the aggregate productivity slowdown in France, which are due to firms' incentives for registering profits in locations different from where production takes place, namely corporate taxation and intangible assets. In this sense, the closest related work to our analysis is (Guvenen et al., 2022), who quantifies the contribution of US MNEs offshore profit-shifting to the slowdown of aggregate productivity by using a *formulary apportionment* technique.[8] Second, and by contrast to (Guvenen et al., 2022), we propose a methodology to correct MNEs' domestic production for profit-shifting that does not rely on apportionment method. Here, mismeasurement of productivity in the domestic economy is estimated based on systematic declines in productivity following the entry of a firm in a tax haven without resorting to apportionment factors that require information on the foreign activity of MNEs affiliates which is not always available and which can themselves be biased. On the one hand, wage bill is not an ideal proxy for value creation since it might capture labor market structure, may not correctly proxy the ownership of intangible assets and can be substituted by other forms of compensation (such as dividends). On the other hand, stocks of tangible capital depends on the local financial accounting conventions while intangible capital is

[8]More specifically, they apportion the worldwide income of MNEs who are headquartered in the US to locations where they have operations, based on a combination of compensation of employees, net profit per employees stocks and stocks of intangible capital.

also likely to be polluted by strategic location within MNEs given its high degree of footloosness and final sales are subject to manipulation ("sale-shifting") and cannot truthfully serve as apportionment factors for MNEs real activity as suggested by the recent work of (Laffitte and Toubal, 2022).

2.3. Data and Stylized Facts

2.3.1. Sources and cleaning

Our main data sources for firms domiciliated in France come from the FICUS and FARE bases and are made available by the French national statistical institute (INSEE) and the public finances directorate (DGFiP). These bases are drawn from fiscal files and no firm size threshold determining the inclusion/exclusion is applied. Hence, there is full coverage of French firms given that every firm is subject to compulsory reporting with fiscal authorities.[9] The FICUS-FARE base contains balance sheet information on value added, employment, capital, depreciation, investment, the wage bill, materials, four-digit sector the firm belongs to, etc. that are important in estimating productivity and labor share. In addition, a unique firm identifier is associated to each firm (siren number) which is used to link it to other French databases (LIFI and DADS) which we use in order to get yearly information in particular on the firms' bilateral presence in a foreign country (and in a tax haven), and on the detailed composition of the firms' workforce and wage bill in France.

The LIFI database is the "financial linkages base" (Liaisons Financières) which comes from the INSEE. More specifically, it provides information about the composition of economic groups through firm's ownership relations (foreign and domestic) of companies residing in Metropolitan France and French overseas departments. LIFI's geographical coverage significantly improved from 2012 onward. Figure 2.6 in appendix 2.9.3 shows the number of jurisdictions and tax havens present in LIFI over time.[10] Although the base has a good coverage, it is not exhaustive in the sense that it is constructed by applying different thresholds. More specifically, it includes firms verifying at least one of the following conditions: having more than 500 employees, holding equity securities above 1.2 million euro, having a turnover of more than 60 million euro, being the parent of a group or being held by foreign capital in the previous year. The survey is complemented with additional administrative sources (DIANE) in order to ensure a better coverage of

[9] Excepting one person firms.

[10] Reassuringly, this geographical extension is not driving the results as shown in robustness checks: see table 2.19 in appendix 2.11.5.

smaller groups. The relevant information that we can extract from this base is the position of the firm within the group (parent, subsidiary), the list of subsidiaries abroad as well as their nationalities, the nationality of the parent when a French firm is a subsidiary of a foreign company and the amount of direct participation of the main shareholders. We construct our main variable of interest, tax haven presence, in such a way that it reflects both the situation where a French residing firm has a parent or an affiliate in a tax haven, which we define according to the IMF list of offshore financial centers reported in the Appendix 2.11.5. While the baseline definition of the treatment focuses only on direct financial links, we provide two alternative definitions of the presence in a tax haven. There is considerable overlap between jurisdictions that are major providers of offshore financial services and those offering profit-shifting opportunities, but they can differ. For this reason, we provide alternative lists of tax havens based on academic work such as the Dharmapala & Hines list ((Dharmapala and Hines, 2009)) or NGOs' list of tax haven such as the one provided by Oxfam (see 2.11.5). In order to reduce the sensitivity of our results to the definition of tax haven, we finally construct a "consensus" list that reports a country as a tax haven if this country is present in a least two of the three lists mentioned above.

Finally, the DADS database (Déclaration annuelle de données sociales) which is provided by the INSEE, is based on mandatory annual reports filled by all firms with employees; it contains annual hours paid in a firm, as well as the number of workers employed by different socio-professional occupation types. The relevant information that we extract from these data is the annual number of firm employees by socio-professional category, which we use to compute a firm-year share of skilled workers. The data cleaning required dropping observations that reported negative values of employment, value added and capital stocks. Table 2.1 reports the main descriptive statistics by firm type for around two million three hundred thousand firms between 1997 and 2015, reflecting the universe of firms that are left after the data cleaning. Among these firms, we observe their transition from "no presence in a tax haven" to "presence in a tax haven" as indicated in Table 2.10, which displays the transition matrix for a Tax haven dummy that takes the value of 1 if there is presence in a tax haven for a certain firm in a given year. In other words, this means that these cases represent 0.12% of all our observations. We wish to emphasize this statistic as the main point that we want to make in this paper relates to the contribution of this tiny proportion of cases to the aggregate slowdown of productivity growth, as will be discussed in section 2.6.

Finally, because our identification strategy relies on the entry of firms in a tax haven, a precise identification of the treatment effect requires a careful design of the working dataset. First,

Table 2.1: Main descriptive statistics by type of firm

	Domestic	MNE non tax haven	MNE Tax haven	Mean (arithmetic)	Median
ln TFP	-0.03	0.11	0.09	-0.03	-0.02
Labor productivity	36.65	62.03	63.62	37.00	30.10
Employees	10	154	371	13	3
Sales	1 758	44 114	73 454	2 503	285
Intangible shares	0.24	0.21	0.23	0.24	0.07
Share of skilled workers	0.07	0.27	0.26	0.06	0.00
Export intensity	0.02	0.20	0.18	0.02	0.00
N firms	2 302 261	33 302	18 490	-	-
N obs	17 555 154	178 269	79 724	-	-

Note: Sales in thousand euro, Labor productivity (ALP) is real value added per hours worked.
ln TFP is constructed based on an index number approach (Caves et al. 1982).
Source: Author's calculations based on FICUS-FARE, DADS and LIFI.

because two-way fixed effect estimation crucially relies on the common trend assumption, our regression sample restricts to firms which are MNEs at any point in time in our sample period so as to reduce differences between the control and the treatment groups (15,431,353 observations dropped). In addition, because that identification strategy is centered around entry in tax haven, we keep only those MNEs in tax havens for which we observe a new tax haven presence and drop those that were present in a tax haven at the beginning of our sample. On top of this, observations of firms which become again "non tax haven MNEs" after having been a tax haven MNE are dropped from the sample (36,372 observations dropped).[11] Lastly, we impose that firms are observed at least 10 years in a row in our dataset. This restriction, applied to control and treated units, improves the balancing properties of the sample and avoids noisy comparisons. Importantly, while these different steps of the cleaning procedure slightly change the magnitude of the coefficient of interest, the effect remains negative and significant at the 1% threshold of the steps described above.[12] This left us with a panel of 327,068 observations of 21,647 MNEs firms throughout the years 1997-2015, whose transition into a tax haven MNE represents 2.4% of the regression sample, as indicated in Table 2.2.

[11] This has the virtue of removing firms present in a tax haven in each year of the analysis, that could increase the risk of "false comparison" identified by (De Chaisemartin and d'Haultfoeuille, 2020)

[12] The coefficient ranges from -1.3% when all firms (including domestic) are kept to -5% when a strictly balanced dataset is imposed

Table 2.2: Transition Matrix (Markov) regression sample

	Dummy Tax haven (final)		
Dummy Tax haven (initial)	0	1	Total
0	97.63	2.37	100.00
1	0.00	100.00	100.00
Total	90.47	9.53	100.00

Note: Transitions in percentages from non-tax haven to tax haven status.
Source: Author's calculations based on FICUS-FARE, DADS and LIFI.

2.3.2. Variable construction

2.3.2.1. Productivity measures

Productivity is a measure of market producers' ability to transform inputs into output. For the sake of robustness, two different productivity measures are calculated in this analysis: the simplest productivity measure -and our preferred one- is the standard apparent labor productivity (ALP) and the more complex one -which is more demanding in terms of data- the total factor productivity (TFP). While the two measures are strongly correlated, they do not exactly capture the same information. The former is defined as the log-ratio of real value added on the average number of hours worked and reflects output per hour worked while the latter, additionally adjusting for the contribution of capital and materials, provides a measure of technological change. Section A in the appendix provides more details for the construction of these two measures. These two productivity measures are used throughout the empirical analysis, where ALP is privileged given that it allows making use of a wider number of observations. Since TFP is very demanding in terms of data, a considerable number of observations are lost with respect to ALP. It should be kept in mind, however, that these two measures do not necessarily need to coincide in the results of the analyses. Even if they are highly correlated, they may differ, particularly for capital-intensive firms and sectors. As previously mentioned, TFP measures control for a broader set of inputs than ALP.[13]

[13]For the next section, all the descriptive statistics are given for ALP while all counterparts for TFP are provided in appendix.

2.3.3. Stylized facts

A first glance at the evolution of the average productivity by firm type, which we classify according to their year-specific status regarding their relation with a foreign tax haven, allows us to motivate our analysis and get an idea of how offshore profit-shifting relates to productivity. Figures 2.1 and 2.2 plot the simple average (or unweighted average) of productivity in the whole market economy by firm type, from 1997 to 2015, as measured by ALP in levels and evolution respectively. Similar figures for TFP are provided in the Appendix 2.10.1. Firms are classified according to their presence abroad in year t, where firm i is classified as an MNE if she has a foreign presence (i.e. one or more affiliates or a parent abroad), to the extent that it doesn't involve any location in a tax haven. In case it does involve a tax haven, the firm will be categorized as a tax haven MNE in that specific year. The rest of firms, including exporters and importers not engaged in FDI (in and outward) in t are classified as domestic.[14]

The first message emerging from these figures is that, with no surprise, MNEs (regardless of whether they are related to a tax haven or not) display similar levels of productivity, which exceed by far those of domestic firms. What is more noteworthy, however, is that average levels of TFP of tax haven MNEs are systematically lower than TFP of MNEs. It is also the case for ALP levels starting from the mid-2000's, with almost identical average ALP levels before 2005 between tax haven and non tax haven MNEs. Additionally, the TFP gap between MNEs and tax haven MNEs is relatively small in 1997 and it starts to widen around 2005. Even if the productivity gap, for both ALP and TFP, seems to start to shrink by the end of the sample period, what its notable is that this productivity divergence coincides with a proliferation of tax haven MNEs in France -as will be explained below- and with a moment in which the country starts to become a relatively high-tax country.[15]

The relative productivity evolution of tax haven MNEs is best appreciated by normalizing it with respect to a given year (1997 in this case), as in Figures 2.2 (and 2.14 in the Appendix 2.10.1 for TFP). A first conclusion from these figures is the significant productivity growth divergence between domestic firms and MNEs that came hand in hand with the financial crisis in 2008. This time, it is tax haven MNEs ALP growth that appears to be systematically lower than that of MNEs

[14]Note that in the econometric analysis, the classification is somewhat different: here MNEs that are in a tax haven are not included in the MNEs group, while in the regressions, an MNE in a tax haven will be attributed a tax haven dummy equal to one as well as an MNE dummy equal to one. This is because we have to control for the positive relation between MNE status and productivity, which would otherwise result in an omitted variable bias.

[15]See Figure 2.12 in the Appendix.

Fig. 2.1. ALP level

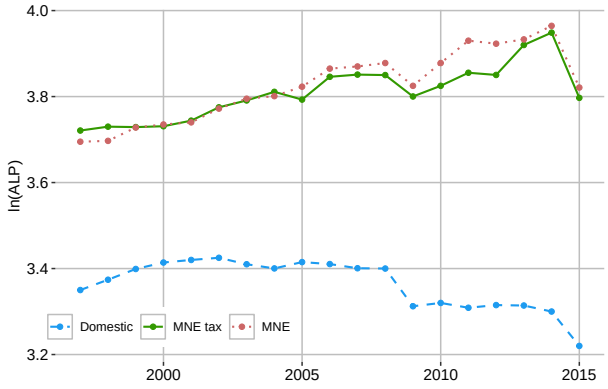
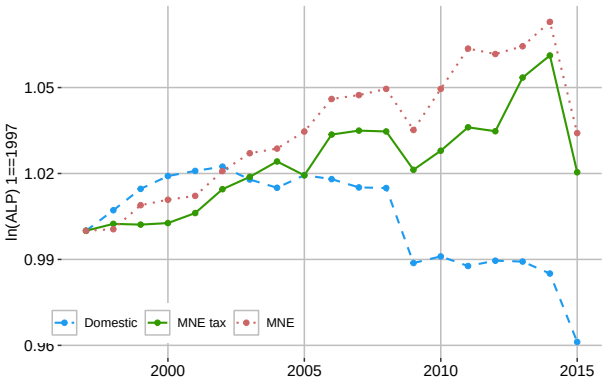


Fig. 2.2. ALP evolution



and the gap widens around 2005. On the other hand, TFP growth for tax haven MNEs closely follows that of MNEs before 2005, where it even appears to be slightly higher but this tendency reverts around 2009.

Indeed, in a context in which the deeper international financial integration over the past two decades has come hand in hand with a redefinition of domestic tax policies, increasingly aiming at supporting competitiveness, there has been a generalized tendency of tax cuts and tax incentives (Clausing et al., 2020). In this global "race to the bottom" in terms of taxation and deregulation, France has become a high corporate tax country with respect to the rest of the world, despite a relatively stable tax rate. Figure 2.12 in the Appendix 2.10.1, is taken from (Vicard, 2019) and shows that this tendency started around the mid-2000's and it accelerates around after the financial crisis in 2009. While it may be true that the statutory corporate tax rate can be very different from what companies effectively pay (usually much less in the case of tax havens), it serves the purpose of illustrating the generalized downward tax tendency around the world – which accelerated after the crisis, and how France stands in it.[16]

In this context, it comes as no surprise that tax haven MNEs proliferate in France in the end of the period. Table 2.13 in Appendix 2.10.2 reports the distribution of our three dummies of interest:

[16]For instance, Luxembourg's statutory corporate tax rate between 2010 and 2020 has on average been 28%, which is one of the highest rates in the world (see KMPG global: https://home.kpmg/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html) while the country is on the top 10 of all of tax havens lists - with the exception, of course, of "governmental lists", which are highly political and from which members are excluded (e.g. the EU list of "non-cooperative tax jurisdictions" doesn't list Luxembourg).

non-tax haven MNEs, tax haven MNEs and all MNEs, over time. It tells for instance, that among the entire set of firm-year MNE observations in our sample, around 4.6% are observed in 1997, 5.4% in 2008 and 6% in 2015. In the case of tax haven MNEs, we observe 2.3% in 1997, while the presence of MNEs in tax havens is more than 4 times higher by the end of the period, with 9.5% of observations in 2015. Thus, while MNEs are almost proportionally distributed over the period, those having a presence in a tax haven are disproportionately distributed over the years, with a high prevalence at the end of the sample. Their presence increases over time and accelerates after 2008.[17] On top of this, the rapid rise of intangible investment, which in major European countries overtook tangible investment around the global financial crisis ((Haskel and Westlake, 2018)), adds to the equation as it facilitates tax avoidance.

As a matter of fact, the proliferation of tax haven MNEs is not a phenomenon specific to France, for instance, (Lane and Milesi-Ferretti, 2018) document that while global portfolio and other types of investment came to a halt in the aftermath of the financial crisis, FDI (the necessary condition for foreign presence), continued to expand. What is notable about this trend, is that it has primarily been driven by FDI in offshore financial centers, as a result, they argue, "of the growing complexity of the corporate structures of large multinationals".

The above stylized facts on the average evolution of productivity by firm type and the proliferation of tax haven MNEs in France are in line with the hypothesis that firms' presence in tax havens distorts domestic productivity. However, how much can this affect aggregate domestic productivity? We believe that it can be important given that these are usually very big firms. MNEs in general and tax haven MNEs in particular are responsible for a large share of aggregate outcomes as they are among biggest firms in terms of sales, production and employment as reported in Table 2.1, where we can observe that they are on average responsible for 16% of employment over the period 1997-2015. Indeed a well established fact in the literature is that international markets are characterized by their granularity as firms engaged in internationalization are on average very large ((Bernard et al., 1995), (Mayer and Ottaviano, 2007)) and internationalization makes large firms even larger ((Pavcnik, 2002), (Bernard et al., 2003)). Going even further, a recent paper by (Martin et al., 2020) shows the very contribution of tax avoidance to sales concentration, implying that offshore profit-shifting allows firms to become even larger.

[17] One may be concerned by the fact that these statistics reflect -at least to some extent- the increased effort that the French administration has made in collecting information on MNEs and their financial linkages over time, however, this bias should equally affect coverage of MNEs and tax haven MNEs.

Dynamic Olley-Pakes Productivity Decomposition. A first exercise with which we can get an approximated idea of the magnitude of tax haven MNEs' contribution to aggregate productivity, and how changes within these firms can affect aggregate changes, makes use of a productivity decomposition. More precisely, we can decompose the change in the aggregate productivity level over the period by including and excluding firms who are present in a tax haven at some point in the sample. In order to do so, we rely on the Dynamic Olley-Pakes Decomposition (DOPD), proposed by (Melitz and Polanec, 2015), a refined version of the static original decomposition (Olley and Pakes, 1996) (OP).

Basically, the OP decomposition allows assessing whether aggregate changes in productivity stem mostly from increases in technical efficiency (or generalized changes in firm productivity) or from allocative efficiency which implies a reallocation of market shares towards firms with high productivity, also referred to as allocative efficiency.[18] The DOPD additionally allows taking into account changes due to firm entries and exits from the market. In our particular case, the decomposition will allow us showing the mechanism through which the contribution of tax haven MNEs affects the most aggregate productivity changes.

Table 2.3: Dynamic Olley-Pakes Decomposition (ALP)

	Δ Aggregate ALP	Within-firm term	Between-firm term	Exitors	Entrants
All firms (1997-2015)	21.51	4.71	19.42	3.90	-6.52
Excl. tax havens (1997-2015)	17.65	4.46	13.82	2.08	-2.71

Source: Authors' calculations using LIFI and FICUS-FARE databases.

The main message of the decomposition is that while the exclusion of tax haven MNEs (those having either an affiliate or a parent in a tax haven) concerns only 18 490 firms (and 79 724 observations) out of 2 354 053 firms (and 17 813 147 observations), the impact on aggregate productivity variation, as measured by ALP, is 4 percentage points (pp) lower than when they are included (17.65 versus 21.51). On top of this, their contribution to the aggregate is essentially explained

[18] A detailed explanation of the DOPD methodology is provided in the Appendix 2.10.2.

by the allocative efficiency term, which is almost 6 pp lower when excluded from the decomposition. This means that these firms are indeed among the most productive at the same time as they have large market shares. This should not come as a surprise in light of the literature and descriptive statistics reported above. The same qualitative message is found when analysing aggregate productivity by focusing on TFP (table 2.12 in Appendix 2.10.2) with an even bigger effect.

This simple exercise shows two important facts about tax haven MNEs. First, that these firms' big market shares translate into big contributions to the changes in the aggregate. Second, that there is a strong selection effect given that firms in tax havens are among most productive firms. These two facts taken together mean that in order to assess the negative contribution of MNEs' offshore profit-shifting to the evolution of aggregate productivity one has to control for selection bias as it is evident that presence in a tax haven is not a randomly assigned variable. Instead, it is the high productive firms who have the incentives and means to offshore profits to low tax countries, which generates a positive selection bias. Therefore, we have to rely on productivity regressions allowing to solve or at least to attenuate the bias, in order to assess the degree of the underestimation of domestic productivity due to MNEs' tax avoidance.

2.4. Empirical Analysis

2.4.1. Tax Havens Presence and Productivity

Empirical strategy. We start by presenting an event study relating labor productivity observed in France before and after the entry of a firm in a tax haven. We are interested in the impact of the $Event_f$, which is the switch from not being present in a tax haven to being present in a tax haven, as follows,

$$\begin{aligned} ln\ Prod_{fst} = &\sum_{j=2}^{J} \sigma_j\ 1[Lag\ j]_{ft} + \sum_{k=1}^{K} \eta_t\ 1[Lead\ k]_{ft} \\ &+ \rho\ MNE_{ft}\ + \gamma\ ln\ Prod_{f,1}\ \times\ firm\ trend_{ft} \\ &+ \alpha\ Z'_{ft} + \ \delta_f + \delta_{st} + \epsilon_{ft} \end{aligned} \tag{2.1}$$

where $Prod_{fst}$ is alternatively measured by ALP_{fst} and TFP_{fst}. $1[MNE_{ft}]$ is a dummy variable for MNE status and it is equal to 1 when firm f has a foreign presence (different from a tax haven) in

year t and 0 otherwise. $ln\,Prod_{f,1} \times firm\,trend_{ft}$ is the initial productivity level of the firm multiplied by the number of years since the firm is observed in the sample. This allows controlling for an eventual mean-reverting process of productivity.[19] Indeed, failure to control for the tendency of high productivity firms to experience a productivity decline over time could bias our results by overstating the negative effect of offshore profit-shifting given that high-productivity firms self-select into tax havens. Z'_{ft} is time-varying firm-level vector of controls (the share of skilled labor, the number of affiliates abroad, export intensity and the size of the firm (log of the number of employees)). δ_f and δ_{st} are firm and 2-digit sector × year fixed effects. The former allow controlling for observable firm heterogeneity to the extent that it doesn't vary over time, while the latter account for aggregate shocks and trends that are common to all firms as well as those that are specific to each 2-digit sector, such as targeted regulations or demand and technology shocks that are sector specific. ϵ_{ft} is the robust standard error term. Given that our data cover the universe of MNEs and that our "treatment" variable of interest (i.e. presence in a tax haven) as well as the dependent variable (productivity) are firm and time specific, we report robust standard errors and not clustered ones.[20] Finally, the set of dummy variables $Lag\ \ j$ and $Lead\ \ k$ denote the distance to the $Event_f$ of interest, which is the first entry into a tax haven, and are defined as follows,

$$
\begin{aligned}
(Lag\ J)_{ft} &= 1[\,t \leq Event_f - J] \\
(Lag\ j)_{ft} &= 1[\,t = Event_f - j]\ for\ j \in \{1, ..., J-1\} \\
(Lead\ k)_{ft} &= 1[\,t = Event_f + k]\ for\ k \in \{1, ..., K-1\} \\
(Lead\ K)_{ft} &= 1[\,t \geq Event_f + K]
\end{aligned}
$$

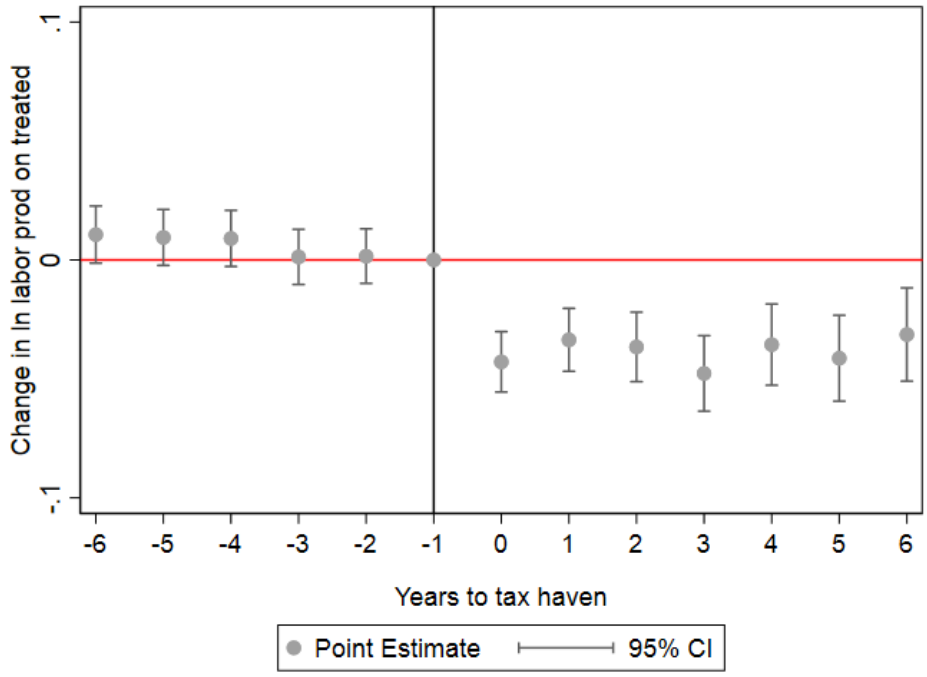
The final lags and leads accumulate lags and leads beyond periods J and K, in our case we set them equal to 7 years. As indicated in equation 2.1, the reference period with respect to which we compare the effect of tax haven entry is $j = 1$, which is the year before the event. As before, we include a set of time-varying observables in Z', we control for the fact of becoming an MNE, for any mean-reversion of productivity, firm size, export intensity, the number of affiliates, the share of skilled workers and, importantly, for unobservable firm time-invariant heterogeneity and shocks varying at the level of the sector. If the conditional common trend assumption

[19] See (Fons-Rosen et al., 2021) for more details.

[20] See (Abadie et al., 2017) for a recent contribution on when and how standard errors should be clustered.

is verified, then the coefficients on the lags should not be significantly different from zero, in which case we could be confident about an effect caused by the tax haven entry. The results of the event study design are plotted in Figure 2.3. The corresponding regression table is presented in appendix 2.11.2.

Fig. 2.3. Event study (ALP)



Note: Plot of estimated coefficients of year dummies indicating the distance to the event of interest: entry into tax haven.

We observe a clear downward negative trend after the tax haven entry, as we did in the previous specifications. The absence of any clear pre-treatment trend makes us confident about the fact that our treatment captures the productivity effect of entering a tax haven and not any other confounding effects. The post-event coefficients suggest long-lasting effects: the bias remains significant 6 years after the entry of a firm in a tax haven suggesting that this feature of their corporate organisation is more structural and more prone to artificial transfers of capital to low-tax jurisdictions.

Within a two-way fixed effects framework we then estimate the *average effect over the sample period* of tax haven presence on the level of productivity. The robustness of our results is validated

in several ways. First, we inspect the potential econometric issues with the two-way fixed effect set-up adopted in the first place by computing the share of negative weights associated to our average treatment effects obtained in the baseline regressions to ensure that the identification procedure is not polluted by a spurious comparison with always-treated entities. Second, we test whether our results are robust to alternative tax haven lists, where three additional lists are used. We also carry a placebo test by assigning the tax haven dummy in a random manner.[21] Third, we inspect the underlying mechanisms of this measurement bias by interacting the presence in tax haven with the intensity of firms in intangible capital and splitting the effect by type of financial connections linking firms to tax havens.

An important coefficient is the average relative change in productivity levels (measured in France) of a given firm when she is present in a tax haven, with respect to the average productivity level that she displayed the years before establishing in a tax haven. Thus, in our preferred specification identification will be purely over time, on those firms who change their status (from no presence to presence in a tax haven) over the period of observations. More specifically, we estimate the following two-way fixed effects model for firm f, belonging to sector s at time t,

$$\begin{aligned} ln\ Prod_{fst} =& \beta_1\ 1[MNE_{ft}]\ + \beta_2\ 1[Tax\ haven_{ft}] \\ &+ \gamma\ ln\ Prod_{f,1}\ \times\ firm\ trend_{ft}\ + \alpha\ Z'_{ft} \\ &+\ \delta_f + \delta_{st} + \epsilon_{ft} \end{aligned} \tag{2.2}$$

Where $1[Tax\ haven_{ft}]$ is an indicator of whether firm f is present in a tax haven (either with a parent or an affiliate company) in year t and 0 otherwise. As for the event study, $1[MNE_{ft}]$ is a dummy variable for the MNE status and it is equal to 1 when firm f has a foreign presence (different from a tax haven) in year t and 0 otherwise. $ln\ Prod_{f,1}\ \times\ firm\ trend_{ft}$ is the initial productivity level of the firm multiplied by the number of years since the firm is observed in the sample. Z'_{ft} is time-varying firm-level vector of controls (the share of skilled labor, the number of affiliates abroad, export intensity). Lastly, in column (2) and (4), we follow the specification imposed for the event study by adding the log of the number of employees of firm f at time t as a control in order to capture any possible changes in real activity in France. Indeed, a recent contribution by (Lopez Forero, 2021) shows that French MNEs downsize employment in France by 8.6% following an entrance in tax havens, suggesting that the use of secrecy jurisdictions al-

[21] See (De Chaisemartin and d'Haultfoeuille, 2020) for details on the problems related to negative weights in two-way fixed effects with heterogeneous treatments and how to solve them.

lows firms to reduce costly employment protection rules. Including it ensures that the downward bias of labor productivity is indeed driven by a bias in the measurement of value added and not by a mechanical decrease of the denominator (number of employees) due to potential strategic relocation of plants. In column (1) and (3) this control is removed.

We expect the coefficient of the tax haven dummy, β_2, to be negative and significant, according to the theoretical predictions. The results from this baseline specification are displayed in column (3) and (4) in Table 2.4 for ALP (and in Table 2.17 in appendix 2.11.1 for TFP). Two variants of these regressions are reported in column (1) and (2), where firm fixed effects are dropped, respectively without and with control for the firm size. Given that our preferred specification includes firm fixed effects, the coefficient of interest captures the differential effect within a given firm, of starting to be present in a tax haven in a given year with respect to the previous years, when she was not a tax haven MNE.

In this sense, in the first two columns, which present the results of a pooled estimation where no firm effects are included, β_2 are interpreted as the differential effect of being a tax haven MNE with respect to the rest of firms. The interpretation of the interaction between the initial level of productivity and the number of years since the firm is present in a tax haven also changes depending on the fixed effect imposed. As explained earlier, including this control ensures that the negative sign obtained for the tax haven dummy is not capturing a mean-reversion when a firm fixed-effect is imposed. Without firm fixed-effect, given that the identification is done across firms and not within firms, there is no reason to expect a negative and significant coefficient given that tax haven MNEs are among the most productive firms in the sample and that these firms also happen to self-select in tax havens (in levels).

Two-way fixed effects results. As expected, the baseline estimation results of equation 2.2 display a negative β_2 which is statistically significant at the highest levels for both productivity measures. The tax haven dummy is always negatively and significantly associated with productivity as seen in Table 2.4 for ALP and in Table 2.17 in appendix 2.11.1 for TFP. Our results suggest that a firm's mere presence in a tax haven translates into lower domestic productivity levels. The tax haven effect is around -3.5% as deducted from our preferred specification displayed in column

Table 2.4: Two-way fixed effect regressions

	(1) labor productivity	(2) labor productivity	(3) labor productivity	(4) labor productivity
[Tax haven$_{f,t}$] =1	-0.0580^a	-0.0620^a	-0.0341^a	-0.0356^a
	(0.0035)	(0.0035)	(0.0039)	(0.0036)
1[MNE]=1	0.0510^a	0.0813^a	0.0022	0.0228^a
	(0.0023)	(0.0023)	(0.0022)	(0.0020)
Share skilled$_{f,t}$	0.0760^a	0.736^a	0.174^a	0.0732^a
	(0.0077)	(0.0078)	(0.0074)	(0.0068)
Num. affiliates$_{f,t}$	0.0035^a	0.0044^a	0.0025^a	0.0029^a
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Export intensity$_{f,t}$	0.0368	0.0375	0.0106	0.0126
	(0.0293)	(0.0300)	(0.0091)	(0.0106)
$lnALP_{f,1}$ × firm trend$_{ft}$	0.0109^a	0.0121^a	-0.0221^a	-0.0204^a
	(0.0001)	(0.0001)	(0.0003)	(0.0003)
Firm size (log emp$_{f,t}$)		-0.0525^a		-0.2740^a
		(0.0008)		(0.0028)
Observations	327068	327068	327068	327068
R^2	0.332	0.345	0.689	0.728
Adjusted R^2	0.330	0.342	0.666	0.707
Firm FE	No	No	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

(4) in Table 2.4.[22] Given that this estimation includes firm fixed effects, we identify the effect of tax haven presence and other covariates by using the variation in firm-level attributes within firm (from one year to another). Thus, our results imply that on average, becoming an MNE who is present in a tax haven (either through an affiliate or a parent) translates into a 3.5% reduction in its level of labor productivity measured in France, with respect to the years before this decision. As mentioned earlier, these estimates are additionally purged from time-varying heterogeneity between sectors, and hence, robust to all shocks that are sector and year specific. Finally, as presented in Table 2.17 in appendix 2.11.1, our results are robust when the effect is tested on TFP instead of labor productivity. Note however, that the coefficient associated with the presence in a tax haven is smaller in magnitude for TFP (1.2%).

[22]Recall that the percentage effect of a dummy in a log-linearized dependent variable is given by: $100[exp(\beta)-1]$, where β is the estimated coefficient of the dummy variable. For instance, for the coefficient of $1[Tax\,haven]$ in column (4) in Table 2.4: [exp(-0.0356)-1] × 100 is equal to -3.5%.

In column (1) and (2), we report estimates of a less stringent version of equation 2.2 where firm heterogeneity is not accounted for and only pair year-2-digit sector effects are included. In this case we identify the covariates and the tax haven effect using the variation in characteristics across firms within sector and year. We find again a negative impact of the tax have presence on firm productivity and the effect is significant at the highest confidence levels as well. Without firm fixed effect, and in our preferred set of control that includes firm size (column (2)), the result suggests that firms who have either a parent or an affiliate in a tax haven display, on average, a labor productivity that is 6% lower than for firms who are not in a tax haven (and 1.4% lower in terms of TFP, as displayed in the appendix).

The estimated coefficients of the rest of the covariates display the expected signs and are highly significant at conventional levels. In line with the literature, our results suggest that MNEs are both more productive than domestic firms ((Helpman et al., 2004a) and that becoming an MNE is related to productivity increases ((Arnold and Javorcik, 2009), (Guadalupe et al., 2012), (Criscuolo and Martin, 2009) and (Fons-Rosen et al., 2021)). In terms of magnitudes, we find an effect of becoming an MNE in our sample is around 0.2% for ALP, which lies within the magnitudes found in earlier literature, as discussed in section 2.2. In the same way, firms with a higher share of skilled workforce and increases in this share within the firm translate into higher productivity level, with stronger effects for ALP than for TFP -which adjusts for capital variation, probably reflecting that skilled workers complement with capital.[23] Interestingly, the coefficient of initial productivity is positive for pooled regression in columns (1) and (2) when we exploit the between-firm variation and is negative in (3) and (4) for the firm fixed effects regression. This shows that firms who initially have high productivity levels are and remain among the most productive ones. Nonetheless, the existence of a reversion to the mean tendency in firm productivity makes them experience a productivity decline over time. This can only be captured in the firm fixed effects regressions, where one identifies variation purely over time within the firm. This result is in line with (Fons-Rosen et al., 2021) who emphasize the importance of controlling for the productivity mean reversion. The inclusion of the log of the number of employees does not change much the coefficient of interest suggesting that most of the measurement bias is channeled by relocation of value added and not by strategic re-organisation of workers internationally. Lastly, as mentioned in section 2.3, LIFI's geographical coverage has been extended from 2012 onward. Some jurisdictions included in the list of tax havens are covered by LIFI only after 2012. This introduces the

[23] See for instance (Acemoglu and Restrepo, 2018) for a recent contribution to the literature on skilled-biased technological change.

risk that firms are classified as entering into a tax haven in 2012 while it is just an artefact linked with LIFI's geographical extension. Table 2.19 in appendix 2.11.5 displays regression results for two robustness tests showing that our main effect is not driven by LIFI's coverage.[24]

Negative weights. In a recent paper (De Chaisemartin and d'Haultfoeuille, 2020) show how two-way fixed effects models can result in unreliable estimates of average treatment effects in the presence of heterogeneous effects across groups and time periods. In particular, they show that such models estimate weighted sums of the average treatment effects (ATE) in each group and period, where weights can be negative. The consequence is that linear regression coefficients can appear to be negative while all the ATEs are positive. If this was the case in our set-up, the negative coefficient of our tax haven variable could be the result of a high proportion of negative weights instead of the mismeasurement hypothesis that we test. We thus compute the share of negative weights associated to our baselines specifications in order to test whether treatment effect heterogeneity is a serious concern for our estimation results. We find that the share of negative weights is close to 2% for the ALP regressions, we therefore conclude that negative weights are not a concern for our results.

Dynamic effects. Is the *conditional independence assumption* (CIA) verified for our "treatment effect"? If it is the case that, conditional on the control variables, the tax haven dummy is independent from productivity changes, we can give a causal interpretation to our regression estimates of β_2. This requires, however, that the common variables that affect treatment assignment and treatment-specific outcomes should be observable. Is it the case? First, it should be emphasized that our estimation approach provides a very stringent test. The set of fixed effects included is exhaustive in that only explanatory variables that simultaneously vary by firm and year can be estimated and where all time variation that is sector specific is purged out. This significantly alleviates concerns regarding omitted variables and alternative explanations. Interestingly, when imposing a firm fixed effect, the magnitude of the tax haven dummy remains relatively stable. By contrast, the dummy variable indicating whether a firm is a multinational one is divided by 4 between column (2) and column (4) in Table 2.4. This change of magnitude is likely to be driven by the self-selection of the most productive firms to multinational production. Indeed when compared *ceteris paribus* to other firms, the MNE status is associated with a higher level of productivity but this effect is largely decreased when the comparison is done within-firm, suggesting that

[24]To do so, we first flag the tax haven jurisdictions observed only after 2012 and remove these jurisdiction from the list. Then, we split the sample before and after 2012 and run the same regression.

this self-selection process explains a significant part of the positive coefficient found in column (1). The fact that this pattern is not observed for the tax haven dummy is reassuring for us as it suggests that the entry in a tax haven does not necessarily follow a self-selection based on firms' idiosyncratic productivity à la (Helpman et al., 2004b).

Nonetheless, we cannot completely rule out the fact that higher productivity can facilitate the entry of firms in tax havens through unobserved channels: all time-varying determinants of firm productivity - which are not included in our regressions, will be *positively* correlated with our treatment variable, $1[Tax\ haven]$. This, in turn, will mean that the CIA won't be verified as $E(\epsilon_{ft}|x_{ft}) \neq 0$ and we won't be able to claim a causal effect. Thus, to the extent that there exist time-varying unobservable determinants of firm productivity, there will be a positive correlation between $1[Taxhaven]$ and the error term, in which case the coefficient of the treatment, $\hat{\beta}_2$, will be biased. However, given that $\hat{\beta}_2$ is negative and highly significant and that $cov(\epsilon, 1[Taxhaven]) > 0$, we believe that the $\hat{\beta}_2$ presented here are likely to be suffering from a bias toward zero.[25] This implies that the mismeasurement of the domestic productivity provided by our estimates should be interpreted as a lower bound of the real mismeasurement of firm productivity.

Note however that assessing the existence of a conditional common trend allows testing whether the dependence between our treatment assignment and the treatment-specific outcome has been removed or at least strongly reduced by conditioning on observable variables. In the case where the choice of entering a tax haven was part of a more general strategy of the firm to re-organize the production and also associated with productivity gains, this would likely pollute the pre-trend with ex-ante changes in the firm's productivity dynamic.[26] The event study presented in figure 2.3 is very reassuring in this respect.

Definition of tax haven. The IMF list adopted in this paper presents several advantages such as its comprehensiveness and the objectivity related to its institutional nature. However, this is a list of offshore financial centers that relates directly to the rules and the importance of the offshore financial instruments. While there is an important overlap between the legal rules facilitating offshore finance and corporate profit-shifting, these financial instruments are not the ones used by MNEs for tax planning strategies. For this reason, as is common in the literature,

[25] This is because the most productive firms go to tax havens, as we saw in the descriptive statistics in Table 2.1.

[26] Recent evidences show that changes in top management are important drivers explaining firms' entry in tax havens and could also be associated with productivity changes. See (Souillard, 2022).

we also test the Dharmapala and Hines (DH) list ((Dharmapala and Hines, 2009), see the list in Appendix 2.11.5) of 41 jurisdictions capturing the coexistence of a low tax rate and legal features prone to tax avoidance.[27] The main difference between these two lists is the presence of Japan and Netherlands in the IMF list. We complement this exercise by the multi-criteria list provided by Oxfam (35 countries). In addition, we construct a list assigning a country as tax haven if it appears on a least two of these three lists (see Appendix 2.11.5).

Finally, an extremely simple but equivalently helpful supplementary check consists in artificially re-defining the "treatment" variable of interest in such a way that it is not related to the original treatment. Therefore, we re-estimate equations 2.2 and replace the tax haven dummy by the placebo dummy, where we randomly assign a tax haven presence across different firms-observations in a proportion that is equivalent to the original number of firms-observations. The interest of doing this is that in case the estimated coefficients on the placebo treatment were similar or pointed in the same direction as our benchmark regressions, it would mean that our tax haven dummy fails to capture our effect of interest: the mismeasurement of the domestic productivity.

Results in Table 2.5 shows that the productivity mismeasurement is robust to alternative tax haven lists in columns (2)-(4), with all tax haven coefficients being significant at the highest levels of acceptance and comprised between 2.8% and 4.5% - to be compared to the 3.5% from the baseline model in column (1). The effect is slightly more pronounced for "restrictive" lists of tax havens (DH-list and consensus list) which are exempt of big tax havens. Indeed the consensus list excludes Japan (only included in the IMF list) and Canada (only included in the Oxfam list) and the DH-list even excludes the Netherlands. This suggests that the effect captured by the tax haven dummy is not polluted by productive transfer of capital toward big tax havens where low taxation is not the only investment determinant. The European tax havens play a key role in this measurement bias highlighting their prominent role for the offshore world as stressed by (Delatte et al., 2022) who find that Ireland, the Netherlands and Luxembourg are part of the 6 countries in which abnormal investment stocks are the highest. In column (5) the list of tax havens is restricted to the European tax havens and we find that the effect is even stronger and statistically significant at the highest levels. In addition, the results of the placebo test displayed in column (6) appear to be positive and unsignificant which is reassuring for the robustness of the results.

[27] This list is itself based upon the Hines and Rice (Hines and Rice, 1994) augmented OECD criteria.

Table 2.5: Alternative lists

	(1) labor productivity	(2) labor productivity	(3) labor productivity	(4) labor productivity	(5) labor productivity	(6) labor productivity
[Tax haven$_{f,t}$] =1	-0.0356^a					
	(0.0036)					
1[MNE]=1	0.0228^a	0.0213^a	0.0218^a	0.0222^a	0.0220^a	0.0157^a
	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0019)
Share skilled$_{f,t}$	0.0732^a	0.0733^a	0.0730^a	0.0732^a	0.0731^a	0.0734^a
	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0068)
Num. affiliates$_{f,t}$	0.0029^a	0.0029^a	0.0030^a	0.0029^a	0.0029^a	0.0028^a
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Export intensity$_{f,t}$	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126
	(0.0106)	(0.0106)	(0.0106)	(0.0106)	(0.0106)	(0.0106)
Firm size (log emp$_{f,t}$)	-0.2740^a	-0.2739^a	-0.2739^a	-0.2740^a	-0.2740^a	-0.2739^a
	(0.0028)	(0.0028)	(0.0028)	(0.0028)	(0.0028)	(0.0028)
$lnALP_{f,1}$ × firm trend$_{ft}$	-0.0204^a	-0.0205^a	-0.0205^a	-0.0205^a	-0.0204^a	-0.0205^a
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
[Tax haven$_{f,t}$] (Oxfam list) =1		-0.0278^a				
		(0.0036)				
[Tax haven$_{f,t}$] (Dharmapala, Hines 2009)=1			-0.0409^a			
			(0.0041)			
[Tax haven$_{f,t}$ (consensus)] =1				-0.0344^a		
				(0.0037)		
[Tax haven$_{f,t}$ (EU)] =1					-0.0456^a	
					(0.0041)	
Tax placebo = 1						0.0000
						(0.0022)
Observations	327068	327068	327068	327068	327068	327068
R^2	0.728	0.728	0.728	0.728	0.728	0.728
Adjusted R^2	0.707	0.707	0.707	0.707	0.707	0.707
F	2.3e+03	2.3e+03	2.3e+03	2.3e+03	2.3e+03	2.3e+03
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

The Cadbury-Schweppes (2006) shock. Building on the fact that an important part of the measurement bias happens within the European Union and in order to further ensure that tax-related motives are driving the mismeasurement bias, it is useful to exploit the heterogeneity among tax havens. More precisely, we make use of the fact that countries can limit the extent to which MNEs benefit from low tax rates in tax havens by imposing Controlled-Foreign-Company (CFC) rules. In the case of CFC rules imposed by France, when a company establishes in a tax haven and it is directly or indirectly owned by a French firm, the share of income attributed to the French controlled company can be taxed. Profits of the controlled company are consolidated within the tax base of the parent company while losses cannot be deducted from the tax base. This ensures a minimum taxation of the economic activity of the affiliate and reduces the incentive for the MNE to locate affiliates in low-tax jurisdictions for tax purposes. However, in 2006, the Court of Justice of the European Union (ECJ) made an important decision through the Cadbury-Schweppes case

and decided that CFC-rules were not compatible with the freedom of capital within the European Union. This decision therefore made European tax havens (Ireland, Netherlands, Luxembourg, Malta and Cyprus) comparatively more profitable for French MNEs as this decision limits fiscal authorities' ability to tax back European affiliates.

We exploit this decision as a shock affecting the tax-planning strategies of European MNEs. Other empirical studies have investigated the impact of this decision: (Schenkelberg, 2020) shows that pre-tax earnings of subsidiaries located in European low-tax jurisdictions increased by 10% after this judgment.(Overesch et al., 2018) provide evidence of decrease of effective tax rate for European MNEs (since the ECJ ruling applies in all member States) after 2005. In our case, the question we ask is whether the profit-shifting-related mismeasurement of productivity is more severe for Europeans MNEs based in France (and therefore present in our administrative database) with affiliates located in European tax havens after 2005 compared to other MNEs in our database. Thus, this difference-in-difference exercise exploits the difference of measured productivity from 2006 onwards between firms with investments in European tax havens before the ruling ("treated group") and other MNEs ("control group"). Because firms can endogenously decide to open-up affiliates in European tax havens following this decision, we add a specification where the control group is restricted to MNEs without presence in European tax havens throughout the whole period. The sample is similar to the one used in the previous regression but firms with a presence in tax havens in 1997 (first year of the sample) are kept since the identification no longer relies on the tax haven entry, explaining therefore the higher number of observations compared to previous regressions. Moreover, since the aim of this exercise is to isolate tax-related strategies' effect on productivity mismeasurement, we add the log of the number of employees to the set of firm level controls to ensure that the results reflect value added virtually shifted to tax havens and not the real changes in value added. We thus estimate the following model,

$$\begin{aligned} ln\ Prod_{fst} =& \beta_1\ 1[MNE_{ft}]\ +\ \beta_2\ 1[Treated\ haven_f]\ \times 1[Post2005] \\ &+\ \gamma\ ln\ Prod_{f,1}\ \times\ firm\ trend_{ft}\ +\alpha\ Z'_{ft} \\ &+\ \delta_f + \delta_{st} + \epsilon_{ft} \end{aligned} \tag{2.3}$$

where $1[Treated\ haven_f]$ takes value 1 if the ruling is binding for the firm when decided by the ECJ and $1[Post2005]$ takes value 1 if the ruling applies, that is, from 2006 onwards.

Table 2.6: The Cadbury-Schweppes shock

	(1) ln labor productivity	(2) ln labor productivity	(3) ln labor productivity
CJE-treated=1 × $post - 2005$ =1	-0.0183^{b}	-0.0189^{b}	-0.0163^{b}
	(0.0068)	(0.0064)	(0.0062)
$lnALP_{f,1}$ × firm trend$_{ft}$		-0.0220^{a}	-0.0224^{a}
		(0.0005)	(0.0005)
$1[MNE_{f,t}] = 1$		0.0301^{a}	0.0260^{a}
		(0.0023)	(0.0021)
Share skilled$_{f,t}$		0.0678^{a}	0.0724^{a}
		(0.0084)	(0.0078)
Num. affiliates$_{f,t}$		0.0002	0.0003
		(0.0002)	(0.0002)
Export intensity$_{f,t}$		0.132^{a}	0.127^{a}
		(0.0091)	(0.0097)
Firm size (log emp$_{f,t}$)		-0.248^{a}	-0.250^{a}
		(0.0036)	(0.0033)
Control group	All MNEs excl. post-2005 EU TH	All MNEs excl. post-2005 EU TH	All MNEs
Regressors	No	Yes	Yes
R2	0.69	0.74	0.74
Observations	402,330	388,607	474,618
Firm-FE	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

As expected, estimation results in Table 2.6 show a negative and significant -at the 5 per cent level - treatment effect on firm-level apparent labor productivity, which translates into a drop by 1.8% in productivity after the ECJ ruling for firms with ex-ante investments in European tax havens. This result holds without any firm-level control (column 1) and is robust to the inclusion of the set of controls introduced in previous exercises (column 2). Given that our set of controls includes the log of employees, we conclude that the effect captured by our treatment variable is driven by virtual shifts of value added towards tax havens and not by real changes in value added. On top of this, this exercise restricts the control group to firms without presence in European tax havens during the whole period ("All MNEs excluding post-2005 EU TH") in order to reduce the risk of pollution of the control group by endogenous decision of firms to invest in European tax haven following the ECJ ruling. However, we can allow for a less restrictive control group by including also MNEs in European tax havens after 2006 as in column (3). Estimation results, while slightly lower, are not significantly altered when allowing for firms that decide to establish in European tax havens after 2006 to enter the control group. A possible explanation for a slightly lower magnitude in the treatment effect is that this coefficient additionally captures the ability of MNEs to establish in a tax haven, which, as we have extensively argued in previous exercises,

should result in a downward bias as only the most productive firms have incentives to shift their profits to tax havens.

Finally, it is worth noting that the treatment effect coefficient from this DiD is more or less divided by two compared to the baseline results. Note however that for the sake of providing a causal interpretation, here we focus on one side of the story only: profit-shifting through European tax havens starting from 2006. Thus, there is no reason to expect an equivalent effect in terms of magnitude as in our benchmark results, where we have a broader definition of tax havens allowing for wider profit-shifting possibilities and where the timing of of the mismeasurement in productivity is also longer as it starts from 1998.

2.5. Underlying mechanisms

Before turning to the macro-economic quantification of this measurement bias, we explore the channels through which firms can shift part of their profits abroad. We can broadly distinguish at least four different ways in which profit-shifting can lead to mismeasurement of the productivity in the home economy.

The first channel through which firms can reduce their profits in high-tax countries is through mispriced intra-firm transactions (transfer pricing) of good or services. Such strategies ultimately artificially reduce the value creation recorded in the domestic economy without corresponding changes in the factors of productions, leading to a reduction of the apparent productivity (labor or TFP). On top of this, a strategic localization of footloose and profitable assets (intangible capital) in low-tax jurisdiction leads to a direct reduction of the tax bill due by firms on their returns. This optimization of asset localization within the multinational firms also induces a loss of the productivity from the perspective of the high-tax country. Recent evidences (see (Laffitte and Toubal, 2022)) show that MNEs can directly set-up contracts in order to record part of their sales in tax havens. Sales shifting no longer affects the link between economic activity and productivity in the intensive margin but artificially conceals part of the production in high-tax countries with a corresponding loss in terms of productivity.

Finally, an interesting assessment is the distinction between the presence of a group in a tax haven through a simple related legal unit that can serve for transfer-pricing or debt shifting purposes

and the switch of the parent company from the domestic country to tax haven (usually through the incorporation of the initial headquarter to a broader group lead by an offshore entity). This strategy, also known as "inversion", might have bigger effects on the total tax bill of an enterprise since it provides the whole group with more business-friendly legislation (bilateral investment treaties signed by the tax haven, corpus of international commitments, etc.) and it facilitates earnings stripping plannings.[28]

Intangibles. Within the same framework, we therefore explore the tax planning strategies driving the productivity mismeasurement in France. We first test whether our benchmark findings are exacerbated for firms that rely intensively on intangible capital. To do so, we begin by re-estimating equation 2.2, which we augment with an interaction term between the "treatment" (presence in a tax haven) and an indicator variable of whether the firm belongs to the high or low intangible intensive firms group. Accordingly, we estimate the following equation on the whole sample,

$$\begin{aligned} ln\ Prod_{fst} =& \beta_1\ 1[MNE_{ft}]\ + \beta_2\ 1[Tax\ haven_{ft}] \\ &+\ \beta_3\ 1[Tax\ haven_{ft}]\ \times 1[Intansh_{ft}\ \geq p50\ Intansh] \\ &+\ \gamma\ ln\ Prod_{f,1}\ \times\ firm\ trend_{ft}\ + \alpha\ Z'_{ft} \\ &+\ \delta_f + \delta_{st} + \epsilon_{ft} \end{aligned} \tag{2.4}$$

where $1[Intansh_f\ \geq\ p50\ Intansh_s]$ is a dummy variable indicating whether the firm belongs to the high or low intangibles intensity group within its sector, where the latter is defined with respect to the median value of intangible share of the sector in which the firm is operating.[29] As with β_2, we expect the coefficient of this interaction, β_3, to be negative and significant if it is the case that intangible assets facilitate offshore profit-shifting. The results from this first strategy are displayed in column (2) and (4) in Table 2.7 (to be compared with the benchmark results from equation(2.2), displayed again in this section for the sake of comparability in column (1) and (3).

[28] The location of corporate debt is an important vehicle for tax optimization: the subsidiary pays interest payments on loans granted by the parent company located in a tax haven and deducts it from its tax bill by reducing its earnings.

[29] More specifically, $Intansh_f\ \geq\ p50\ Intansh_{st}$ indicates that the share of intangible assets (over total assets) of firm is above the median intangible share of assets of its sector s. Where,

$$Intansh_f = \frac{Intangibles_f}{Intangibles_f + Tangibles_f}$$

and where $p50\ Intansh_{st}$ is the median value observation (not average) of intangibles share observed in sector s at time t.

Table 2.7: The role of intangible capital

	(1) labor productivity	(2) labor productivity	(3) labor productivity	(4) labor productivity
1[MNE]=1	0.0022	0.0022	0.0228^{a}	0.0229^{a}
	(0.0022)	(0.0022)	(0.0020)	(0.0020)
Share skilled$_{f,t}$	0.1738^{a}	0.1738^{a}	0.0732^{a}	0.0731^{a}
	(0.0074)	(0.0074)	(0.0068)	(0.0068)
Num. affiliates$_{f,t}$	0.0025^{a}	0.0025^{a}	0.0029^{a}	0.0023^{a}
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Export intensity$_{f,t}$	0.0106	0.0106	0.0126	0.126
	(0.0091)	(0.0091)	(0.0106)	(0.0106)
$lnALP_{f,1}$ × firm trend$_{ft}$	-0.0221^{a}	-0.0221^{a}	-0.0204^{a}	-0.0204^{a}
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
[Tax haven$_{f}$] =1	-0.0341^{a}	-0.0244^{a}	-0.0356^{a}	-0.0469^{a}
	(0.0039)	(0.0052)	(0.0036)	(0.0049)
[Tax haven$_{f}$] = 1 × 1[Above p50 intangible share$_{f,t}$]		-0.0169^{a}		0.0169^{b}
		(0.0068)		(0.0064)
Firm size (log emp$_{f,t}$)			-0.274^{a}	-0.274^{a}
			(0.0028)	(0.0028)
Observations	327068	327068	327068	327068
R^2	0.689	0.689	0.728	0.728
Adjusted R^2	0.666	0.666	0.707	0.707
F	839.5190	719.8909	534.7111	1999.92
Firm FE	Yes	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

Estimation results in Table 2.7 only partly confirm our priors. First, the mechanism that we test with the help of the interaction term between our variable of interest, tax haven entry, and intangibles intensity in column (2) suggests that, on average, when a firm belonging to the bottom 50 percent of intangible intensity within its sector enters a tax haven, she experiences a 2.4% drop on its productivity level (to be compared to -3.4%, the baseline result displayed in column 1). This effect remains significant at the highest levels of acceptance. Whereas, the effect is exacerbated for firms whose average share of intangibles is above the median share of their sector, again statistically significant at the 1 percent level. In this case, our results suggest an average productivity level decline by more than 4% when these firms become tax haven MNEs.[30]

However, when the control for firm size is added the effect is reversed: controlling for the (log) number of employees, firms relying more intensively on intangible capital display a lower change

[30] As explained in footnote 22, the percentage effect of a dummy in a log-linearized dependent variable is given by: $100[exp(\beta) - 1]$, where β is the estimated coefficient of the dummy variable. Here, non-interacted coefficient in column (2 in Table 2.7 leads to an effect of: [exp(-0.0244)-1] × 100 is equal to -2.41% while the total effect is given by [exp(-0.0244-0.0169)-1] × 100=4.04%

in their measured productivity in France following an entry in a tax haven. These results suggest that more intangible firms use tax havens in a different way in comparison to low intangible intensive firms, in particular because the former seem to expand, both in terms of sales and value added when entering in tax havens [31]. This suggests that productivity changes related to tax haven entry are also driven by changes in employment as a result of the tax haven entry -and not only by mismeasurement in value added, and this seems to be true only for intangible intensive firms. This can be inferred by comparing results in columns (1) and (3), which show that the inclusion or exclusion employment as a control variable leaves the tax haven entry coefficient almost unchanged. Thus, our preferred interpretation for results in column (4) is that high intangible intensive firms are in strong expansion episodes -which in turn goes hand in hand with a decision to enter in a tax haven. Indeed, results in column (4) show that when controlling for changes in employment results in a considerably higher tax haven entry coefficient resulting in a productivity decline by 4.6% form firms below the median value of intangibles intensity, whereas the total effect is attenuated for intangible intensive firms, with an average productivity decline by 3%. Yet these results need to be taken with caution given the imprecision of the measure of intangible capital when using balance-sheet firm level data.

Links with tax havens. Next, we explore the differences between the financial connections linking a firm to an offshore entity in table 2.8. The first exercise that we perform, displayed in column (2), is to disentangle the tax haven entry effect on productivity between an entry via headquarters versus an entry via an owned entity. In column (3), the definition of presence in tax havens is extended to minority holding: a firm is considered to be present in a tax haven even when it has a financial link below 50%. Column (4) includes "sister affiliates" within the treatment group.[32] Figure 2.7 in appendix 2.9.3 simplifies and summarizes these financial links. Lastly, in column (5) these sister affiliates are removed from the database. The intuition behind this trimming is to remove these entities that are not directly treated but that might be affected through group-wide tax planning schemes and are therefore improper control and treated units.

Results displayed in column (2) in Table 2.8 show that the coefficient for the headquarters tax

[31] Table 2.20 in the appendix shows regression results for employment and value added and they show that the negative main effect of tax haven entry in both of these variables is compensated by the positive effect of the interaction term of tax haven entry and the dummy for intangible intensive firms. Where the total positive effect is higher for employment than for value added, probably due to profit shifting.

[32] That is, when two firms with two different identifiers belong to the same group but that only one of the two owns an affiliate in a tax haven, the two entities can be considered as treated.

Table 2.8: Type of presence in tax haven

	(1)	(2)	(3)	(4)	(5)
	labor productivity	labor productivity	labor productivity	labor productivity	labor productivity
[Tax haven$_{f,t}$] =1	-0.0356^a				-0.0300^a
	(0.0036)				(0.0038)
1[MNE]=1	0.0228^a	0.0231^a	0.0209^a	0.0155^a	0.0271^a
	(0.0020)	(0.0020)	(0.0020)	(0.0019)	(0.0022)
Share skilled$_{f,t}$	0.0732^a	0.0730^a	0.0733^a	0.0734^a	0.0693^a
	(0.0068)	(0.0068)	(0.0068)	(0.0068)	(0.0071)
Num. affiliates$_{f,t}$	0.0029^a	0.0029^a	0.0029^a	0.0028^a	0.0031^a
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Export intensity$_{f,t}$	0.0126	0.0126	0.0126	0.0127	0.1018^a
	(0.0106)	(0.0106)	(0.0106)	(0.0106)	(0.0120)
log $ALP_{f,1}$ × firm trend$_{ft}$	-0.0204^a	-0.0205^a	-0.0205^a	-0.0205^a	-0.0206^a
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Firm size (log emp$_{f,t}$)	-0.2740^a	-0.2740^a	-0.2739^a	-0.2740^a	-0.2799^a
	(0.0028)	(0.0028)	(0.0028)	(0.0028)	(0.0030)
1[Tax haven HQ$_{f,t}$] =1		-0.0409^a			
		(0.0038)			
1[Tax haven af.$_{f,t}$] =1		0.0080			
		(0.0109)			
[Tax haven (+/- 50)$_{f,t}$] =1			-0.0262^a		
			(0.0034)		
[Group in tax haven$_{f,t}$] =1				0.0025	
				(0.0026)	
Observations	327068	327068	327068	327068	297808
R^2	0.728	0.728	0.728	0.728	0.727
Adjusted R^2	0.707	0.707	0.707	0.707	0.704
F	2.3e+03	2.0e+03	2.3e+03	2.3e+03	2.2e+03
Firm FE	Yes	Yes	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

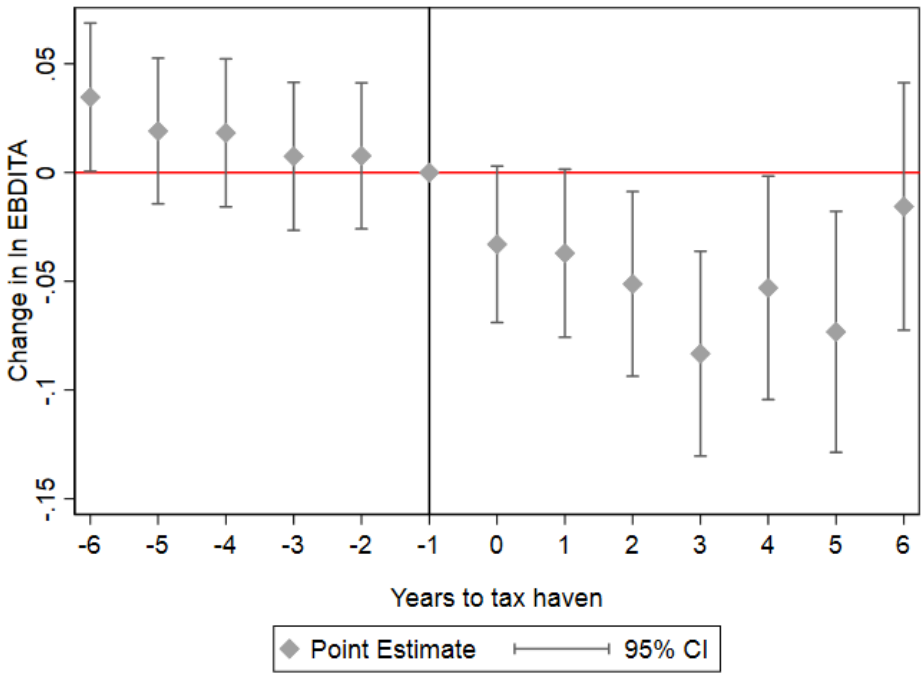
haven dummy is higher than the tax haven dummy in the benchmark model (4.1% to be compared to 3.5%), in terms of magnitude and significance, while the tax haven affiliate dummy displays a null effect. This suggests that the productivity decline related to profit-shifting that we estimate throughout the paper is driven by French firms owned by a legal entity located in a tax haven rather than by firms owing an affiliate in a tax haven. This result is both surprising and informative about the underlying channel through which profit-shifting operates. Relocating decision centers, a process often referred to as "inversion" strategies, is a way of determining which set of tax rules will prevail regarding transfers of dividends and interests between the affiliate and the headquarter.[33] This heterogeneity also matters for the quantification of the aggregate effect of the measurement bias performed in section 2.6. While the coefficient is higher, it also applies to a smaller group of firms. Table 2.15 in appendix 2.10.2 depicts the contribution to employment and value-added of units owned by entity located in a tax haven. Column (3) in table 2.8 shows that

[33]The incentives to do inversions are particularly high under worldwide taxation regimes but also exist under territorial tax regimes via the application of CFC rules and non-resident withholding tax rules, for instance.

extending the treatment definition to minority holding slightly decreases the magnitude of the coefficient (close to 3%) but confirms the decline in observed productivity in France with a firm's financial link with a tax haven. By contrast, as presented in column (4), no effect is observed when affiliates that are only indirectly treated are added to the treatment group. This result is reassuring as it suggests that these entities are relevant control units. This is confirmed in column (5) where these entities are removed from the sample and we find that the main coefficient of interest remains relatively stable.

Last but not least, our argument behind the impact of having a presence in a tax haven on measured productivity is that it is a consequence of firms' profit shifting to tax havens. It is therefore important to check that, indeed, having a new presence in a tax haven leads to a decrease in profits reported in France. To do so, we implement an event-study design in the same fashion as in equation 2.1, where the dependent variable is firm's profits - as measured by its EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) - instead of its productivity. Figure 2.4 displays the results of this regression: it shows a plot of the estimated coefficients of the year dummies reflecting the distance to the year of the tax haven entry. The corresponding table can be found in the appendix 2.11.2. Figure 2.4 supports the hypothesis that MNEs' tax haven presence is related to profit-shifting. Indeed, pre-tax haven entry year dummies coefficients are not significantly different from zero and a sustained drop is found after the tax haven entry. Profits decline on average by 5% the year the firm first enters a tax haven and the effect fluctuates around -10% after 3 years.

Fig. 2.4. Event study EBIDTA



Note: Plot of estimated coefficients of year dummies indicating the distance to the event of interest: entry into tax haven.

2.6. From Micro to Macro: Aggregate Productivity

The previous sections have presented firm evidences that are in line with our predictions and the literature on how international tax optimization by MNEs can contribute to productivity mismeasurement in high-tax countries. Given that MNEs and particularly those with a presence in tax havens are on average very big firms who are responsible for a significant share of total sales, employment and value added, one should expect changes happening within these firms to affect aggregate changes as well.[34] In this sense, we aim at assessing the share of the aggregate variation of productivity that can be explained by micro-level fiscal optimization of MNEs. We do so with the help of our regression results, the tax haven MNEs' weights on total employment and the change in the proportion of firms who have become tax haven MNEs over the sample period. Because the mismeasurement seems to be driven by incorporation (i.e. when a firm is owned by an entity located in a tax haven), we use the specific coefficient associated with the headquarters' presence in a tax haven - those results in column 2 in table 2.8, and correct the

[34]See descriptive statistics in Table 2.1 for more details.

productivity trajectory for these firms only.

Predicted aggregate productivity levels. We begin by computing the observed change in aggregate productivity, next we compute the predicted change in aggregate productivity which should have occurred had not firms been incorporated in tax havens. In other words, had firms not located their headquarters in a tax haven. Finally we compute the difference between these two aggregates, which gives us an approximation of the loss of aggregate productivity that is due to the micro-level offshore profit-shifting of MNEs. Aggregate productivity ($Prod_t$) in a given year t can be expressed as the weighted sum of individual productivities, as follows,

$$Prod_t = \sum_i \omega_{i,t} \cdot Prod_{i,t} = \frac{\sum_i VA_{i,t}}{\sum_i L_{i,t}}$$

where $Prod_{it}$ can either be ALP or TFP, both in logs or levels and where ω_{it} is the size weight of the firm which can be value added, sales or inputs. In the case where $Prod_{it}$ is measured as value added per hour (in levels) and the weights are employment shares (in terms of hours), $Prod_t$ measures aggregate value added per hour. This is because in this case the weighted average of ALP is exactly equal to the aggregate measure of ALP, defined as the sum of firms' value added over the sum of firms' total number of hours worked. This particular choice has thus the advantage that the aggregate productivity measure that results from the firm-level measure can have a direct data counterpart.[35] Additionally, one can express aggregate productivity in terms of the contribution of firms following their status as domestic or non-tax haven MNEs (NT) on the one hand and tax haven MNEs (TH) on the other hand,

$$Prod_t = \sum_{i \in NT,t} (\omega_{i,t}^{NT} Prod_{it}^{NT}) + \sum_{i \in TH,t} (\omega_{i,t}^{TH} Prod_{it}^{TH})$$

where the aggregate change in productivity levels between 1997 and 2015 is given by the difference of each groups' contribution to the weighted average productivity levels in 1997 and in 2015, as follows,

[35] More specifically, if aggregate labor productivity is given in levels and labor is the chosen weight, such that $\omega_{i,t} = \frac{L_{i,t}}{\sum_i L_{i,t}}$, the weighted average exactly corresponds to the aggregate ALP:

$$ALP_t = \frac{\sum_i VA_{i,t}}{\sum_i L_{i,t}} = \frac{\sum_i VA_{i,t} \cdot \frac{L_{i,t}}{L_{i,t}}}{\sum_i L_{i,t}} = \sum_i \left(\frac{VA_{i,t}}{L_{i,t}} \cdot \frac{L_{i,t}}{\sum_i L_{i,t}} \right) = \sum_i \omega_{i,t} \cdot Prod_{i,t}$$

For different ways of aggregating productivity see (Van Biesebroeck, 2008). Such exact aggregation using total factor productivity appears to be more cumbersome.

$$\begin{aligned}\Delta Prod_{97-15} = Prod_{15} - Prod_{97} &= \sum_{i,15}(\omega_{i,15}Prod_{i,15}) - \sum_{i,97}(\omega_{i,97}Prod_{i,97}) \\ &= \sum_{i\in NT,15}(\omega^{NT}_{i,15}Prod^{NT}_{i,15}) - \sum_{i\in NT,97}(\omega^{NT}_{i,97}Prod^{NT}_{i,97}) \\ &+ \sum_{i\in TH,15}(\omega^{TH}_{i,15}Prod^{TH}_{i,15}) - \sum_{i\in TH,97}(\omega^{TH}_{i,97}Prod^{TH}_{i,97})\end{aligned} \tag{2.5}$$

Our econometric results imply that if every MNE that established their headquarter in a tax haven between 1997 and 2015 had decided not to, its predicted ALP level in 2015 would have been on average 4% higher. Thus, the predicted aggregate productivity change in levels is given by the following expression,

$$\begin{aligned}\widehat{\Delta Prod}_{97-15} = &\sum_{i\in NT,15}(\omega^{NT}_{i,15}Prod^{NT}_{i,15}) - \sum_{i\in NT,97}(\omega^{NT}_{i,97}Prod^{NT}_{i,97}) \\ &+ \sum_{i\in TH,15}\omega^{TH}_{i,15}\underbrace{Prod^{TH}_{i,15}}_{\text{observed}}\underbrace{[1+|exp(\widehat{\beta}^{TH})-1|]}_{\text{predicted gain}} - \sum_{i\in TH,97}(\omega^{TH}_{i,97}Prod^{TH}_{i,97})\end{aligned} \tag{2.6}$$

where $\widehat{\beta}_{TH}$ is the estimated coefficient from equation (2.2) and the expression "predicted gain" is the only thing that changes with respect to equation 2.5. This term represents the additional productivity that we would have observed had THMNEs not been present in a tax haven. Table 2.9 displays the observed aggregate labor productivity in 1997 and in 2015, the difference between these two aggregates, the predicted aggregate labor productivity in 2015 if THMNEs had not been present in tax havens and the predicted change with respect to 1997. Given the choices made to calculate the aggregate, ALP represents aggregate value added per hour (in our sample), which are tantamount to 34.7 euros per hour in 1997 and 38.9 in 2015.[36] Thus, we observe an increase of 4.1 euros per hour in aggregate labor productivity levels between 1997 and 2015.

Our econometric estimates imply that the predicted aggregate labor productivity level in 2015, $\widehat{Prod}_{15}$, would have been 39.1 euros per hour had we not observed firms in tax havens and everything else had remained equal. In which case, the predicted difference with respect to 1997 is 4.4

[36]It is worth noting that our sample is composed of firms in the market economy who have at least one employee, it excludes therefore public administrations and self-employed. Additionally we drop some specific sectors and firms after the data cleaning. This means that aggregate value added per hour does not necessarily coincide with official statistics.

euros per hour. Thus, we find a 6% difference at the aggregate labor productivity level throughout the whole sample period, due to presence of MNEs in tax havens.[37] This suggests that the "lost productivity", which we claim to be "mismeasured" productivity, has an important macro effect. To see this more clearly, it is useful calculating the respective growth rates of productivity.

Table 2.9: Observed and Predicted Aggregate Labor productivity

	$Prod_{97}$	$Prod_{15}$	$\Delta Prod_{_{97-15}}$	$\widehat{Prod}_{15}$	$\Delta\widehat{Prod}_{97-15}$
$ALP = \frac{\sum_i VA_i}{\sum_i L_i}$	34.7	38.9	4.1	39.1	4.4

Source: Authors' calculations using LIFI and FICUS-FARE databases.

Predicted aggregate annual productivity growth. In order to calculate the predicted loss in the annual aggregate growth rate of labor productivity we begin by calculating the observed *annual* growth rate of aggregate labor productivity, APG_{97-15}, as follows,

$$APG_{97-15} = \left[\left(\frac{Prod_{2015}}{Prod_{1997}} \right)^{1/18} - 1 \right] = 0.63\%$$

which we compare to the predicted annual aggregate productivity growth rate,

$$\widehat{APG}_{97-15} = \left[\left(\frac{\widehat{Prod}_{2015}}{Prod_{1997}} \right)^{1/18} - 1 \right] = 0.66\%$$

We find thus a difference of 0.04 percentage point between the predicted and the observed annual aggregate labor productivity growth (0.628-0.664 = 0.036), which is equivalent to 5.7% loss in the annual growth rate of labor productivity at the aggregate level (expressed in terms of the

[37] This number reflects the predicted difference in aggregate productivity changes as a percentage: (4.39-4.14)/4.14=0.06.

observed annual labor productivity growth).[38]. Figures 2.5 displays the evolution of the observed aggregate labor productivity between 1997 and 2015 and the profit-shifting corrected aggregate labor productivity. If we suppose that the effect is equally parted between all years of the period, and if we start from the same level in 1997, the ratio between predicted and observed labor productivity for year n after 1997 is equal to $(1.0066/1.0063)^{n-1997}$

Fig. 2.5. Aggregate Productivity

Note: observed productivity computed based on FARE data. Productivity is corrected for the 4% downward bias of measured productivity of firms owned by an entity located in a tax haven (regression 2, table 2.8).

2.7. Conclusions

This paper adds to the literature that examines GDP and productivity mismeasurement issues related to intangible investment and offshore profit-shifting by MNEs. Indeed, the significant slowdown in aggregate productivity over the past two decades has become a major concern in advanced economies. We argue, as (Guvenen et al., 2022) do for the case of the US, that official French productivity statistics are significantly distorted by MNEs' profit-shifting behavior. We propose a new methodology to measure the magnitude of this bias at the firm-level based on systematic deviation of domestic apparent productivity following the entry of a firm in tax haven. This method implies less assumptions regarding the production function of MNEs and is robust

[38]This number reflects the annual labor productivity growth that is lost in terms of the observed annual labor productivity growth: (0.0066435-0.006283)/0.006283=0.057

to a series of robustness checks.

Relying on data of the universe of French firms over 1997-2015 and their bilateral investment abroad, we test whether shifting profits to low tax jurisdiction underestimates domestic productivity and whether the effect is particularly concentrated among intangible intensive firms. For robustness concerns we consider firm productivity by means of two different measures, apparent labor productivity (ALP) and total factor productivity (TFP). Our estimates imply that firm productivity experiences a statistically significant slowdown over the immediate years following an establishment in a tax haven, presumably because part of the profits are not anymore recorded in the home country. More precisely, we show that firm productivity in France experiences a decline with respect to the years before the tax haven presence, with an average estimated drop by 3.5% in labor productivity and 1.3% in total factor productivity. In addition, we find that there are strong dynamic effects, where the longer the presence in a tax haven the more important the decrease in productivity. On top of this, we explore the channel through which firms shift value added offshore: the effect we find is especially strong in firms that are intensive in intangible capital, arguably because this type of assets is more easily transferred across countries. Our results also suggest that this bias is more severe when firms establish their parent company in a tax haven.

Given these firms' strong weight in aggregate value added and employment, their productivity evolution has a significant impact at the aggregate level. Our results imply that if tax haven MNEs had not established a new presence in tax havens between 1997 and 2015, aggregate labor productivity annual growth would have been 0.04 percentage point higher, which is tantamount to 5.7% of the observed aggregate labor productivity annually. Besides, our findings are robust to a placebo tax haven presence treatment or to the definition of tax haven adopted. Finally, exploiting exogenous legal changes from the European Court of Justice, this paper is able to isolate the central role of tax optimization in this measurement bias.

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2.8. Appendices

2.9. Main variables and data description

2.9.1. ALP construction

Apparent Labor Productivity (ALP): is defined as the log-ratio of real value added on the average number of hours worked.

$$\ln ALP_{it} = \ln \left(\frac{V_{it}}{L_{it}} \right)$$

where V_{it} denotes the value added of the firm i in year t, deflated by sectoral price indexes published by INSEE (French System of National Accounts). L_{it} is the average number of hours worked at the firm level, defined as the product of firm employees and 2-digit sector average yearly hours worked per employee. Sector averages are also taken from INSEE. The advantage of using value added instead of gross output or total revenues in this measure is that it controls for the usage of intermediate inputs. For instance, for firms in the retail sector whose activity is based on reselling goods, gross output-based ALP will appear to be very high. As value added is measured as the difference between output (or sales) and intermediate inputs, value added-based ALP allows controlling for differences in intermediate input intensity across firms. Nonetheless, value added-based ALP does not control for differences in capital intensity between firms, and neither for differences in other inputs that are not accounted for in the value added. Total factor productivity (TFP) measures allow this problem to be alleviated, as they control for a broader set of inputs, particularly capital.

2.9.2. Total Factor Productivity (TFP) construction

This is a non-parametric estimation computed by using the so-called *Multilateral Productivity Index* developed by **?** and extended by **?**.[39] The advantage of this method is that it is based on an index number approach which provides a productivity measure defined as the deviation

[39] Alternative methods for calculating productivity in the literature consist in estimating a production function with inputs capital (K), labor (L) and materials (M) to explain output (Y) and then retrieving the residual. Various strategies aiming at accounting for the endogeneity of labor have been proposed. The most widely used is **?**, which is a modification of the approach proposed by **?** and **?** to control for unobserved productivity shocks using intermediate inputs. **?** proposes a joint estimation method that sidesteps some of the drawbacks associated with the various two-step procedures and leads to more efficient estimators.

with respect to a reference firm. Thus, it does not require a direct estimation of technology, which implies making assumptions about the underlying production functions. More precisely, we compute the TFP index for firm i at time t as follows,

$$\begin{aligned}\ln \mathrm{TFP}_{it} = \ln Y_{it} - \overline{\ln Y_t} + \sum_{\tau=2}^{t} \left(\overline{\ln Y_\tau} - \overline{\ln Y_{\tau-1}}\right) \\ - \sum_{n=1}^{N} \frac{1}{2} \left(S_{nit} + \overline{S_{nt}}\right) \left(\ln X_{nit} - \overline{\ln X_{nt}}\right) \\ - \sum_{\tau=2}^{t} \sum_{n=1}^{N} \frac{1}{2} \left(\overline{S_{n\tau}} + \overline{S_{n\tau-1}}\right) \left(\overline{\ln X_{n\tau}} - \overline{\ln X_{n\tau}}\right)\end{aligned}$$

where Y_{it} is real gross output of firm i at time t, using the set of inputs X unit (labor, capital and materials). S unit is the cost share of input X unit in the total cost. The symbols with an upper bar are the corresponding measures for the reference point (the hypothetical firm). They are computed as the arithmetic mean of the corresponding firm level variables over all firms in year t. Subscripts τ and n are indices for time and inputs, respectively. This methodology is particularly suited to comparisons within firm-level panel data sets as it guarantees the transitivity of any comparison between two firm-year observations by expressing each firm's input and output as deviations from a single reference point for each year.

We rely on firm-level data for nominal output and inputs variables and on industry level data for price indexes, average worked hours and depreciation rates.

Output

Gross output is deflated using sectoral price indexes published by INSEE (French System of National Accounts).

Labor

Labor input is calculated by multiplying the number of effective workers at the level of the firm (i.e. number of employees plus number of outsourced workers minus workers taken from other firms) by the average worked hours at the sector level. We rely on sector data given that there is no data on hours worked in the FICUS-FARE census. The annual series for worked hours are

available at the 2-digit industry level and provided by the INSEE.

Capital input

Capital stocks are computed using investment and tangible assets (in book values) following the traditional perpetual inventory method (PIM), as follows,

$$K_t = (1 - \delta_{t-1})\, K_{t-1} + I_t \tag{2.7}$$

where δ_t is the depreciation rate and I_t is real investment (deflated nominal investment). Both investment price indexes and depreciation rates are available at the 2-digit industrial classification from INSEE data series.

Intermediate inputs

Intermediate inputs are defined as purchases of materials and merchandise, transport and traveling, and miscellaneous expenses. These are deflated using sectoral price indexes for intermediate inputs published by INSEE (French System of National Accounts).

Input cost shares

We begin by computing the total cost of production of firm i, belonging to industry I at time t, as follows,

$$CT_{it} = w_{it}L_{it} + c_{It}K_{it} + m_{It}M_{it} \tag{2.8}$$

where w, c and m denote the wage rate, the user cost of capital and price index for intermediate inputs, respectively. Labor, capital and intermediate inputs cost shares are then respectively given by,

$$s_{Lit} = \frac{w_{it}L_{it}}{CT_{it}} \;;\; s_{Kit} = \frac{c_{It}K_{it}}{CT_{it}} \;;\; s_{Mit} = \frac{m_{It}M_{it}}{CT_{it}} \tag{2.9}$$

Labor cost share is computed by using the variable "labor compensation" in the FICUS and FARE census as a proxy for the theoretical variable $w_{it}L_{it}$. It includes total wages plus income tax withholding. The intermediate inputs cost share is computed by relying on variables on intermediate

goods consumption in the FICUS-FARE census and the price index for intermediate inputs in industry I provided by INSEE.

The "user cost of capital" is the rental price of capital and is computed following **?**, which in the presence of a proportional tax on business income and of a fiscal depreciation formula (we abstract from any tax credit allowance), is given by,

$$c_{It} = (r_t + \delta_{It} - \pi_t^e) \left(\frac{1 - \tau_t z_I}{1 - \tau_t} \right) p_{IKt} \tag{2.10}$$

where τ_t is the business income tax in period t and Z_I represents the present value of the depreciation deduction on one nominal unit investment in industry I. Finally, the depreciation is calculated as follows,

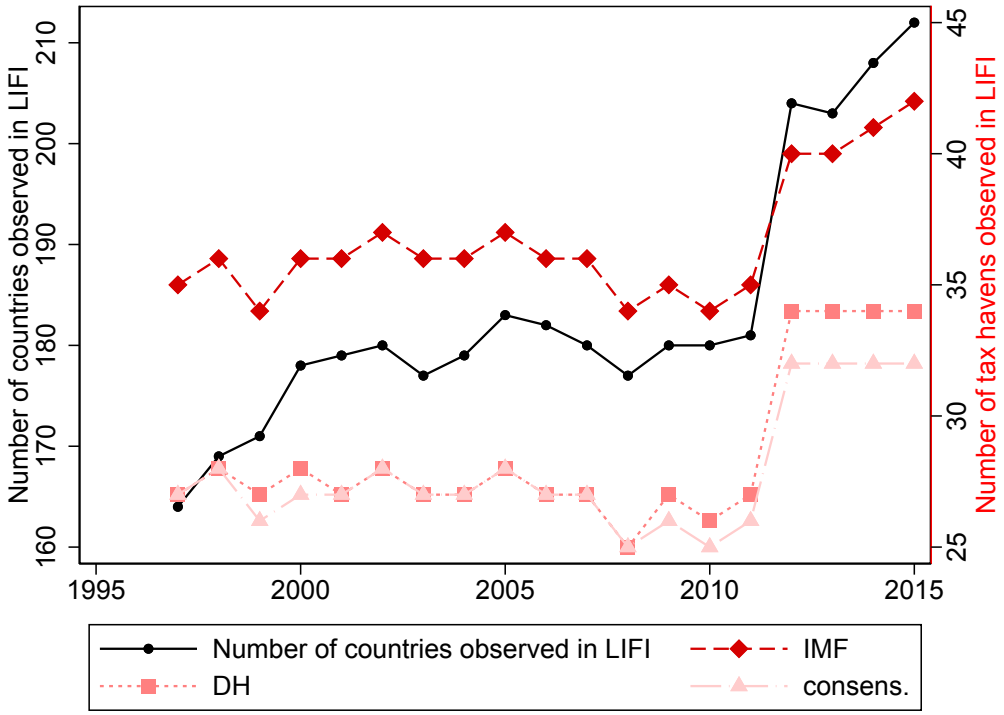
$$z_I = \sum_{t=1}^{n} \frac{(1 - \bar{\delta}_I)^{t-1} \delta}{(1 + \bar{r})^{t-1}}$$

where $\bar{\delta}_I$ is a mean of the industrial depreciation rates and $\bar{r}$ is a mean of the nominal interest rate over the period.

2.9.3. LIFI's coverage and treatment definition

LIFI coverage. Before 2012, the LIFI database was mainly based on an annual survey filled by legal entities about their shareholders and ownership structure. From 2012 onward, the survey has been replaced by administrative data as well as private sources. This novel methodology improved LIFI's quality and comprehensiveness. In particular, the number of groups (from 53,000 in 2011 to 123,000 in 2015) and jurisdictions observed (190 to 210) has increased significantly. The figure that follows (figure 2.6) depicts the number of jurisdiction observed in LIFI (left axis) as well as the number of tax havens according to the DH and the IMF lists (right axis). A jump is observed between 2011 and 2012.

Fig. 2.6. LIFI's geographical coverage



Treatment definition. The type of financial connections linking an entity to an offshore jurisdiction can be manifold. The first distinction that can be made is the direction of the ownership: a firm can be owned by an entity in a tax haven (figure 7) or be the owner of an affiliate or subsidiary in a tax haven (figure 8). The first case is identified in the LIFI database as the presence of a ultimate owner in a tax haven (variable SIRTG located in a jurisdiction flagged as tax haven). In the second case, we distinguish between three distinct cases: (a) direct ownership, (b) minority-holding ownership and (c) indirect ownership.

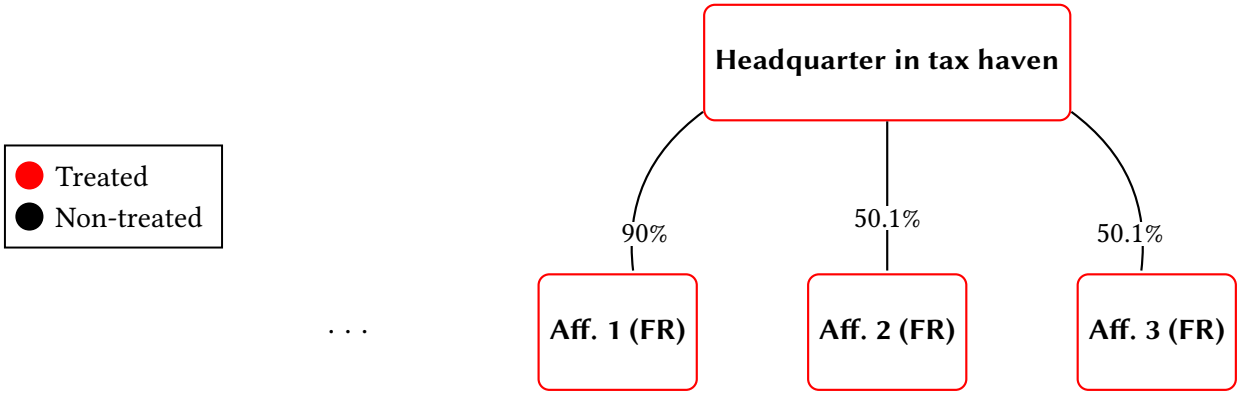


Fig. 2.7. Ownership links and treatment definition through headquarter in tax havens.
+1 218 entities per year on av.

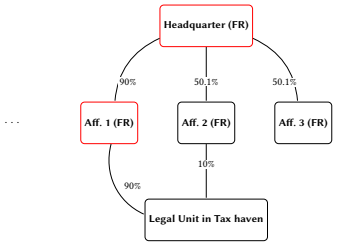


Fig. 2.8. Direct ownership
+300 entities per year on av.

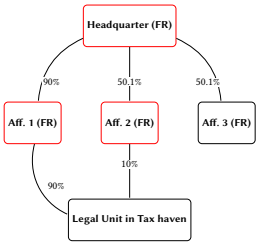


Fig. 2.9. Direct links
+30 entities per year on av.

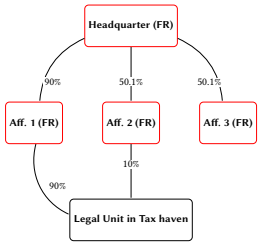


Fig. 2.10. Indirect links
+1756 entities per year on av.

Fig. 2.11. Ownership links and treatment definition through legal units in tax havens

Table 2.10: Transition Matrix (Markov) raw data

	Dummy Tax haven (final)		
Dummy Tax haven (initial)	0	1	Total
0	99.88	0.12	100.00
1	17.90	82.10	100.00
Total	99.51	0.49	100.00

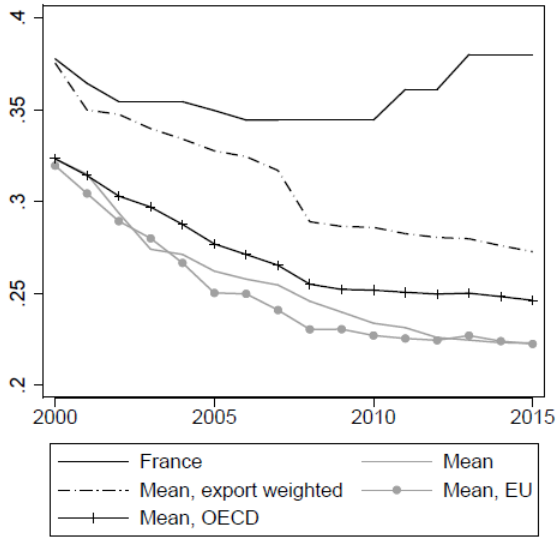
Note: Transitions in percentages from non-tax haven to tax haven status and vice-versa.
Source: Author's calculations based on FICUS-FARE, DADS and LIFI.

2.9.4. Transition matrices

2.10. Additional descriptive statistics

2.10.1. Descriptive statistics

Fig. 2.12. Statutory Corporate tax rate France and partners



Source: Vicard (2019)

2.10.2. Productivity decomposition

Dynamic Olley-Pakes Decomposition (DOPD). Aggregate evolutions are the result of changes at the micro level, where a pertinent question to ask is whether there are compositional effects. In particular, one would like to know if the changes in the aggregate productivity in France stem mostly from generalized changes in firm productivity (i.e., the average firm increases its produc-

Table 2.11: Pre-Tax haven entry MNE status

MNE status	Frequency	Percent	Cumulative
0	6,921	76.88	76.88
1	2,081	23.12	100.00

Note: Frequencies and percentages of MNE status (that is, that the firm was either domestic or MNE) in the year previous the first Tax haven entry.
Source: Author's calculations based on FICUS-FARE, DADS and LIFI.

Fig. 2.13. TFP levels

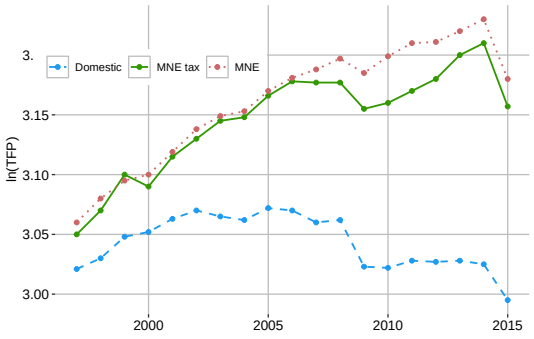
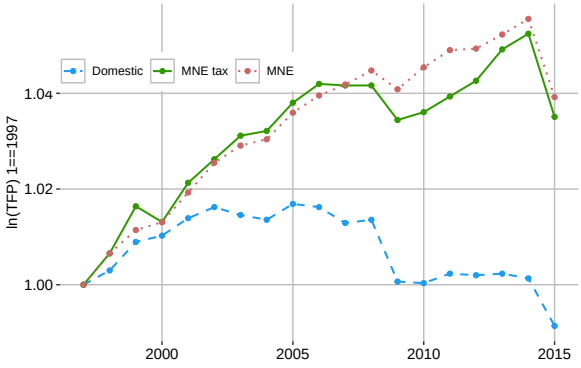


Fig. 2.14. TFP evolution



tivity at constant market shares), from reallocation of market shares towards firms with high productivity (at constant levels of productivity) or from firm entering and exiting the market. In order to assess this question we follow Melitz and Polanec (2015) decomposition for productivity, which we apply to aggregate productivity changes.

The decomposition à la Melitz-Polanec, is just a refined measure of the Olley-Pakes (OP) decomposition, where dynamics are taken into account.[40] The advantage of this decomposition is that it reduces the biases due to the fact of not accounting for entries and exits (relative to the basic OP 1996), and those due to the fact of using the same reference productivity level for the contribution of survivors, entrants and exitors – i.e., the decompositions based on **?**. The authors show that the

[40] As a reference, the basic OP decomposition (Olley and Pakes (1996)) for a given point in time is,

$$\Phi = \underbrace{\left[\frac{1}{N}\sum_{i}^{N}\phi_i\right]}_{\text{Technical efficiency}} + \underbrace{\sum_{i}^{N}(s_i - \bar{s})\left(\phi_i - \bar{\phi}\right)}_{\text{Allocative efficiency}}$$

Where aggregate productivity Φ is decomposed into a within-firm component (first term) and a between-firm component (second term), which is the covariance between the market share of the firm, s_i, and its productivity ϕ_i.

consequence of these biases is an underestimation of the contribution of an improved allocative efficiency (between firm component). More precisely, we decompose aggregate productivity as follows,

$$\Delta\Phi = \underbrace{\Delta\phi_S}_{\text{Within-firm}} + \underbrace{\Delta\ \text{cov}_S}_{\text{Between-firm}} + \underbrace{S_{E2}\left(\Phi_{E2} - \Phi_{S2}\right)}_{\text{Entrants}} + \underbrace{S_{X1}\left(\Phi_{S1} - \Phi_{X1}\right)}_{\text{Exitors}}$$

Where the change of aggregate productivity Φ of individual firms ϕ_i in a given sector between year 1 and year 2 (in sub-indices) is decomposed into four terms accounting for the contribution of survivors (subindex S), exitors (X) and entrants (E). The first term is the within-firm contribution and is the average productivity change of surviving firms in the two periods (S in sub-indices); the second term is measured as the between-firm contribution and is the change in the allocation of market shares among survivors, it is measured as the covariance between firm market shares and productivity; the third term is the contribution of entrants (E which by definition are only observed in period 2 and where the productivity reference is that of surviving firms in period 2); and a fourth term which captures the contributions of exitors (X which are only observed in period 1 and whose productivity is compared to that of the surviving firms in period 1).

Table 2.12: Dynamic Olley-Pakes Decomposition (TFP)

	Δ Aggregate TFP	Within-firm term	Between-firm term	Exitors	Entrants
All firms 1997-2015	16.36	4.95	19.07	-3.22	-4.43
Excl. tax havens 1997-2015	9.04	4.82	6.70	-0.17	-2.30

Source: Authors' calculations using LIFI and FICUS-FARE databases.

Table 2.13: Evolution of MNE and tax haven MNE

	No tax haven	Tax haven	Total
1997	4.6	2.3	4.5
1998	4.5	2.4	4.5
1999	4.6	4.0	4.6
2000	4.8	4.1	4.8
2001	4.7	4.3	4.7
2002	4.9	4.4	4.9
2003	5.0	4.5	4.9
2004	5.0	4.3	5.0
2005	4.9	4.6	4.9
2006	5.2	4.7	5.2
2007	5.3	5.0	5.3
2008	5.4	5.2	5.4
2009	5.9	5.7	5.9
2010	6.0	6.5	6.0
2011	5.9	6.4	6.0
2012	5.8	7.3	5.9
2013	5.9	7.7	5.9
2014	5.9	7.2	6.0
2015	6.0	9.5	6.0
Total	100.0	100.0	100.0

Source: Author's calculations based on LIFI-FICUS-FARE.

Table 2.14: Descriptive statistics all firms

Year	Value added	Number of employees	Number of hours worked
1997	359 529 144	8 135 020	12 613 167
1998	398 187 783	8 791 588	13 591 588
1999	420 406 597	9 053 865	13 953 330
2000	452 525 794	9 491 750	14 411 573
2001	476 684 001	9 902 736	14 823 172
2002	494 655 594	10 097 724	14 891 264
2003	510 551 860	10 151 221	14 985 894
2004	542 181 383	10 434 232	15 615 388
2005	569 219 637	10 494 881	15 739 552
2006	600 725 278	10 790 571	15 995 004
2007	638 489 395	10 976 377	16 461 186
2008	671 286 769	11 488 083	17 318 719
2009	637 173 840	11 754 636	17 475 784
2010	657 461 175	11 821 887	17 709 353
2011	677 046 112	11 857 434	17 852 131
2012	675 230 190	11 753 580	17 615 001
2013	678 055 693	11 664 321	17 335 075
2014	699 995 496	12 004 105	17 791 901
2015	687 045 219	12 259 094	18 222 416

Source: Author's calculations based on LIFI-FICUS-FARE.

Table 2.15: Descriptive Statistics firms in Tax havens

Year	Parent	Affiliate	Parent	Affiliate	Parent	Affiliate
	Value added		Number of employees		Number of hours worked	
1997	23 080 547	64 948 359	436 303	931 107	667 666	1 445 116
1998	27 100 281	70 794 319	575 468	953 876	861 471	1 468 689
1999	33 452 275	68 038 976	698 551	905 651	1 044 110	1 394 247
2000	38 255 718	67 586 652	665 991	937 559	1 001 238	1 409 071
2001	44 311 082	66 187 433	815 506	911 735	1 215 290	1 370 397
2002	43 154 326	67 701 192	773 601	927 802	1 139 347	1 372 534
2003	45 262 848	46 771 381	774 421	436 057	1 142 699	634 580
2004	41 476 547	69 366 929	714 851	876 763	1 069 204	1 308 675
2005	42 453 442	62 343 704	743 647	777 690	1 118 721	1 157 746
2006	43 510 452	62 687 953	768 857	780 258	1 130 495	1 151 061
2007	52 546 948	59 792 155	796 074	731 480	1 183 911	1 091 929
2008	48 090 771	44 899 170	827 025	468 875	1 234 144	699 913
2009	55 926 757	45 869 206	962 453	471 436	1 421 287	696 895
2010	58 414 186	56 868 164	1 029 069	709 266	1 537 510	1 065 571
2011	60 757 334	61 204 011	1 048 992	750 624	1 572 287	1 131 422
2012	64 110 998	65 122 284	1 031 522	799 340	1 539 406	1 198 517
2013	67 982 677	69 923 853	1 080 777	797 732	1 599 853	1 184 579
2014	51 246 284	69 608 576	689 502	734 707	1 018 114	1 089 826
2015	81 638 973	57 295 356	1 010 151	606 939	1 510 502	902 550

Source: Author's calculations based on LIFI-FICUS-FARE.

Table 2.16: Weights all

Year	Parent	Affiliate	Parent	Affiliate	Parent	UL
	Value added		Number of employees		Number of hours worked	
1997	6.42	18.06	5.36	11.45	5.29	11.46
1998	6.81	17.78	6.55	10.85	6.34	10.81
1999	7.96	16.18	7.72	10.00	7.48	9.99
2000	8.45	14.94	7.02	9.88	6.95	9.78
2001	9.30	13.88	8.24	9.21	8.20	9.24
2002	8.72	13.69	7.66	9.19	7.65	9.22
2003	8.87	9.16	7.63	4.30	7.63	4.23
2004	7.65	12.79	6.85	8.40	6.85	8.38
2005	7.46	10.95	7.09	7.41	7.11	7.36
2006	7.24	10.44	7.13	7.23	7.07	7.20
2007	8.23	9.36	7.25	6.66	7.19	6.63
2008	7.16	6.69	7.20	4.08	7.13	4.04
2009	8.78	7.20	8.19	4.01	8.13	3.99
2010	8.88	8.65	8.70	6.00	8.68	6.02
2011	8.97	9.04	8.85	6.33	8.81	6.34
2012	9.49	9.64	8.78	6.80	8.74	6.80
2013	10.03	10.31	9.27	6.84	9.23	6.83
2014	7.32	9.94	5.74	6.12	5.72	6.13
2015	11.88	8.34	8.24	4.95	8.29	4.95
Mean	8.40	11.42	7.55	7.35	7.50	7.34

Source: Author's calculations based on LIFI-FICUS-FARE.

2.11. Additional tables and robustness checks

2.11.1. Baseline results on TFP

Table 2.17: Baseline

	(1) ln TFP	(2) ln TFP	(3) ln TFP	(4) ln TFP
$1[\text{Tax haven}_{f,t}]$ =1	-0.0138^a	-0.0145^a	-0.0123^a	-0.0123^a
	(0.0016)	(0.0015)	(0.0018)	(0.0017)
$1[\text{MNE}_{f,t}] = 1$	0.0070^a	0.0171^a	0.0016^a	0.0077^a
	(0.0009)	(0.0010)	(0.0009)	(0.0009)
$\text{Share skilled}_{f,t}$	0.283^a	0.277^a	0.0675^a	0.0347^a
	(0.0036)	(0.0036)	(0.0041)	(0.0040)
$\text{Num. affiliates}_{f,t}$	0.0005^b	0.0009^b	0.0008^b	0.0009^b
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$\text{Export intensity}_{f,t}$	0.0294^b	0.0297^b	0.0218^a	0.0223^a
	(0.0089)	(0.009)	(0.0036)	(0.0040)
$\ln(\text{employees}_{f,t})$		-0.0165^a		-0.0849^a
		(0.0003)		(0.0014)
$ln\text{TFP}_{f,1} \times \text{firm trend}_{ft}$	0.0278^a	0.0277^a	-0.0307^a	-0.0294^a
	(0.0005)	(0.0004)	(0.0009)	(0.0096)
Observations	312954	312954	312954	312954
R^2	0.340	0.346	0.669	0.688
Adjusted R^2	0.337	0.344	0.644	0.664
Firm FE	No	No	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

2.11.2. Event study - Tables and robustness checks

Table 2.18: Event Study

	(1) ln labor productivity	(2) ln EBITDA
1[MNE]=1	0.0236^{a}	0.0286^{a}
	(0.0020)	(0.0057)
Share skilled$_{f,t}$	0.0735^{a}	-0.0253
	(0.0068)	(0.0164)
Export intensity$_{f,t}$	0.0126	0.0131
	(0.0106)	(0.0123)
Num. affiliates$_{f,t}$	0.0029^{a}	0.0015^{b}
	(0.0003)	(0.0007)
$lnALP_{f,1}$ × firm trend$_{f,t}$	-0.0204^{a}	-0.0323^{a}
	(0.0003)	(0.0007)
Firm size (log emp.$_{f,t}$)	-0.2744^{a}	0.5660^{a}
	(0.0028)	(0.0053)
lead7	-0.0261^{a}	-0.0304^{b}
	(0.0050)	(0.0148)
lead6	0.0106^{c}	0.0347^{b}
	(0.0061)	(0.0174)
lead5	0.0095	0.0191
	(0.0060)	(0.0171)
lead4	0.0090	0.0182
	(0.0060)	(0.0173)
lead3	0.0013	0.0074
	(0.0059)	(0.0174)
lead2	0.0016	0.0077
	(0.0058)	(0.0171)
lag0	-0.0429^{a}	-0.0330^{c}
	(0.0065)	(0.0184)
lag1	-0.0336^{a}	-0.0371^{c}
	(0.0067)	(0.0197)
lag2	-0.0366^{a}	-0.0512^{b}

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Table 2.18 – continued from previous page

	(1) ln labor productivity	(2) ln EBITDA
	(0.0075)	(0.0217)
lag3	-0.0477[a]	-0.0833[a]
	(0.0081)	(0.0240)
lag4	-0.0356[a]	-0.0530[b]
	(0.0087)	(0.0262)
lag5	-0.0413[a]	-0.0732[b]
	(0.0092)	(0.0283)
lag6	-0.0314[b]	-0.0156
	(0.0100)	(0.0290)
lag7	-0.0354[a]	-0.0523[b]
	(0.0077)	(0.0229)
Observations	327068	267101
R^2	0.728	0.810
Adjusted R^2	0.707	0.793
F	807.4427	660.7673
Firm FE	Yes	Yes
2-dig. sector x year FE	Yes	Yes

Robust *s.e.* in parentheses; [c] $p < 0.10$, [b] $p < 0.05$, [a] $p < 0.01$.

2.11.3. LIFI geographical coverage

Table 2.19: Robustness to LIFI's 2012 extension

	(1) labor productivity	(2) labor productivity	(3) labor productivity	(4) labor productivity	(5) labor productivity	(6) labor productivity
[Tax haven$_{f,t}$] =1	-0.0580^{a}		-0.0341^{a}		-0.0369^{a}	-0.0108
	(0.0035)		(0.0039)		(0.0049)	(0.0100)
1[MNE]=1	0.0510^{a}	0.0509^{a}	0.0022	0.0022	0.0029	-0.0053
	(0.0023)	(0.0023)	(0.0022)	(0.0022)	(0.0026)	(0.0062)
Share skilled$_{f,t}$	0.7602^{a}	0.7603^{a}	0.1738^{a}	0.1738^{a}	0.1551^{a}	0.1071^{b}
	(0.0077)	(0.0077)	(0.0074)	(0.0074)	(0.0080)	(0.0245)
Num. affiliates$_{f,t}$	0.0035^{a}	0.0035^{a}	0.0025^{a}	0.0034^{a}	0.0031^{a}	0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0010)
Export intensity$_{f,t}$	0.0368	0.0368	0.0106	0.0098	0.0100	0.0110
	(0.0293)	(0.0294)	(0.0091)	(0.0091)	(0.0087)	(0.0215)
$lnALP_{f,1}$ × firm trend$_{f,t}$	0.0109^{a}	0.0109^{a}	-0.0264yma	-0.0221^{a}	-0.0253^{a}	-0.0143^{a}
	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0004)	(0.0024)
[Tax haven in LIFI before 2012$_{f,t}$] =1		-0.0575^{a}		-0.0338^{a}		
		(0.0035)		(0.0039)		
Observations	327068	327068	327068	327068	265515	60576
R^2	0.333	0.332	0.689	0.689	0.706	0.856
Adjusted R^2	0.330	0.330	0.666	0.666	0.678	0.804
F	5.6e+03	5.6e+03	839.5190	839.3567	667.55	9.19
Firm FE	No	No	Yes	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust *s.e.* in parentheses; ^{c} $p < 0.10$, ^{b} $p < 0.05$, ^{a} $p < 0.01$.

2.11.4. Intangible intensive firms

Table 2.20: Intangible intensive firms

	(1) ln labor productivity	(2) ln num. workers	(3) ln value added
$1[MNE_{f,t}] = 1$	0.00221	0.0755[a]	0.0777[a]
	(0.00218)	(0.00280)	(0.00286)
Share skilled$_{f,t}$	0.174[a]	-0.367[a]	0.193[a]
	(0.00742)	(0.0107)	(0.0101)
Num. affiliates$_{f,t}$	0.00254[a]	0.00141[b]	0.00396[a]
	(0.00034)	(0.00044)	(0.00040)
Export intensity$_{f,t}$	0.016	0.00732	0.0180
	(0.00907)	(0.00577)	(0.0147)
$lnALP_{f,1}$ × firm trend$_{ft}$	-0.0221[a]	0.00587[a]	-0.0162[a]
	(0.000332)	(0.000454)	(0.000475)
[Tax haven$_{f,t}$] =1	-0.0244[a]	-0.0821[a]	-0.106[a]
	(0.00521)	(0.000647)	(0.00685)
[Tax haven$_f$] = 1 × 1[Above p50 intangible share$_{f,t}$]	-0.0169[b]	0.133[a]	0.116[a]
	(0.00679)	(0.00982)	(0.00918)
Observations	327068	327068	327068
Firm FE	Yes	Yes	Yes
2-dig. sector x year FE	Yes	Yes	Yes

Robust *s.e.* in parentheses; [c] $p < 0.10$, [b] $p < 0.05$, [a] $p < 0.01$.

2.11.5. Lists of tax havens

Table 2.21: List of tax havens

	Dharmapala-Hines	**Oxfam**	**IMF**	**Consensus**
Albania		✓		
Andorra	✓		✓	✓
Anguilla	✓	✓	✓	✓
Antigua-and-Barbuda	✓	✓	✓	✓
Antilles (Netherlands)	✓	✓	✓	✓
Aruba		✓	✓	✓
Bahamas		✓		
Bahrain	✓	✓	✓	✓
Barbados	✓		✓	✓
Belize	✓		✓	✓
Bermuda		✓	✓	✓
Bosnia & Herzegovina		✓		
British Virgin Island	✓	✓		✓
Canada		✓		
Cayman Islands	✓		✓	✓
Curacao		✓		
Cyprus			✓	✓

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Table 2.21 – continued from previous page

	Dharmapala-Hines	Oxfam	IMF	Consensus
Cook Islands	✓		✓	✓
Costa Rica			✓	
Djibouti			✓	✓
Dominica	✓		✓	✓
Feroe Islands		✓		
Gibraltar	✓		✓	✓
Greenland		✓		
Grenada	✓			
Guam		✓	✓	✓
Guernesey	✓		✓	✓
Hong-Kong	✓	✓	✓	✓
Isle of Man	✓		✓	✓
Ireland	✓	✓	✓	✓
Israel			✓	✓
Japan (Japananese Offhsore Market)	✓			
Jersey	✓	✓	✓	✓
Jordan	✓		✓	✓
Lebanon	✓		✓	✓
Liberia	✓		✓	✓
Liechtenstein	✓		✓	✓
Luxembourg	✓	✓	✓	✓
Macao	✓		✓	✓
Malaysia			✓	✓
Maldives	✓			✓
Malta	✓	✓	✓	✓
Northern Mariana Islands			✓	
Marshall Islands	✓	✓	✓	✓
Mauritius		✓		
Montenegro		✓		
Micronesia			✓	
Monaco	✓		✓	✓
Montserrat	✓		✓	✓
Nauru		✓	✓	✓
Niue		✓	✓	✓
Netherlands		✓	✓	✓
Oman		✓		
Palau		✓		
Panama	✓		✓	✓
Philippines			✓	✓
Serbia		✓		
Saint Lucia	✓		✓	✓
Saint Kitts	✓			
Saint Vincent	✓			
Samoa			✓	
Seychelles			✓	
Singapore	✓	✓	✓	✓
Switzerland	✓	✓	✓	✓
Taiwan		✓		
Trinidad and Tobago		✓		
Thailand			✓	

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Table 2.21 – continued from previous page

	Dharmapala-Hines	Oxfam	IMF	Consensus
Turks and Caicos Islands	✓		✓	✓
Uruguay			✓	
UAE		✓		
Vanuatu	✓	✓	✓	✓
Number of countries	38	35	50	45

3

Strategic litigation in a globalized world: How Investor-State Disputes Shape Policy Diffusion

Abstract

The annual number of lawsuits between multinational firms and States through Investor-State Dispute (ISDS) panels is steadily increasing. In the context of a growing need for international regulatory cooperation, these disputes are controversial because of the chilling effect they may have on policy adoption and diffusion. This paper first investigates theoretically whether these concerns are well grounded, and then, under which conditions investors can strategically challenge a regulation in one country in order to hinder its diffusion in other jurisdictions where they have a presence. Multinational firms might have incentives to do so when their legal bases are close from one country to another, and when States' expected litigation costs are sufficiently high. These predictions are tested empirically using the landmark case of the tobacco industry, a highly globalized sector where many regulatory disputes between multinational firms and States have arisen. The results suggest that litigation does hinder policy diffusion.

3.1. Introduction

"[I]s that a credible threat or is it really an attempt to bully and scare us?". This question was asked by an Irish policy maker about the legal risks associated with the adoption of the plain packaging regulations in December 2013. In 2011, Philip Morris had indeed sued Australia for having passed a similar bill.[1] This example shows a form of globalization of policy making, where both the best regulatory practices and legal precedents spread across borders.

Different waves of globalization have fostered the need for international regulatory coordination

[1]This question, highlighted by (Moehlecke, 2019) can be found in the Irish parliamentary records.

and facilitated policy diffusion at the global scale. Yet, concomitant to the spread of international conventions, international investment agreements mushroomed across the globe, providing investors with extended legal means to protect their assets. As a result, the adoption of regulations by States result from push and pull factors. This paper investigates the interplay between international coordination and international investment law. More specifically, it explores the extent to which multinational firms can strategically use investor-State dispute settlement panels to curb the regulatory environment that they face. The case of tobacco-control policies is the perfect case-study in this respect: tobacco-related policies are very comparable across countries since the signature by 168 jurisdictions of the Framework Convention for Tobacco Control in 2003 and were the target of two emblematic investor-State disputes in 2010 and 2011. As suggested by the initial quote, these tensions proved key in the policy diffusion of tobacco-related policies.

On the theoretical side, this paper makes two important contributions. First, it contributes to the policy diffusion literature by providing a theoretical framework in which countries learn from the past experiences of adoption of regulations. Second, the model built in this paper extends the standard models of litigation to the international investment context where legal precedents are weaker signals given the differences of legal bases across countries. By adding uncertainty regarding the merits of transnational plaintiffs - the multinational firms -, the model makes new predictions on the incentives to challenge early adopters of regulations. On the empirical side, this paper defines and identifies a "regulatory chill" effect as a disruption to policy diffusion patterns. Standard spatial models of policy diffusion are refined by taking into account both domestic and international litigations. Overall, this paper sheds a new light on the legal and regulatory consequences of globalization.

This new method and findings are key in understanding the legal forces at play in any multilateral initiative. Beyond the example of tobacco policies, policy making is increasingly undertaken at the global scale and shaped by international law. Fossil fuel phase-out, carbon pricing or anti-profit shifting rules are examples of initiatives that cannot be undertaken by individual countries, and of the globalization of policy making. However, individual countries need to take into account the transnational nature of the investors and their access to legal protection. In this

context, investor-State disputes in a given country can create global precedents.[2] Multinational enterprises (MNE) catalyze the spread of norms and regulations since they operate in multiple jurisdictions. In particular, given the wide coverage of international treaties with Investor-State Disputes Settlement mechanisms provisions, multinational firms can sue governments not only in order to challenge a State's decision, but also to send a signal to the other jurisdictions in which they operate. In turn, governments can hold back regulatory decisions after observing previous disputes between investors and States. In contrast, the signal sent by cases raised under national law is weaker, given the limited external validity of domestic courts' rulings.

Taken from the States' perspective, this paper also documents the role of investor-State disputes in the diffusion of policies at the global scale. The determinants of policy diffusion has mostly been investigated among sub-national bodies of federations. Still, the high degree of openness of economies makes it crucial to coordinate regulation beyond the national borders, as highlighted by the recent sanitary and environmental crises. While the globalization of trade, investment and even cultural norms has been the focus of an entire body of economic literature, the globalization of law and policy making remains under-studied. International investment agreements provide a global legal structure through which judiciary outcomes in one country can be used as a precedent in another country. This ultimately brings the framework of analysis of global policy diffusion closer to the one used within federations.

Most papers on investments protection focus on the efficient design of the contracts linking States and investors: while too weak a protection of investment gives rise to hold-up problems, too stringent contracts can lead to a "regulatory chill" effect. With this in mind, this paper investigates the strategic behavior of multinational enterprises and of governments *given the existing framework of investments protection.* A simple game between a multinational firm and the jurisdiction in which it operates is sketched in the first part of the paper. When legal costs are not too high, firms might engage in strategic lawsuits against early adopters of regulations in order to limit their diffusion. This incentive increases with the degree of legal integration among countries: when MNEs' legal basis is similar across countries, legal action taken against a State constitutes a clearer signal from the point of view of surrounding countries.

[2]Recent attacks of multinational firms against coal-phase outs acts (Uniper vs. The Netherlands (2020), RWE vs. The Netherlands (2020)) show that the legal framework linking investors and States also shape the cost and the implementability of evidence-based green policies. In the international tax context, lawyers point potential conflict between the new OECD-BEPS standards such as the minimum tax and the existing investment treaties ((Herzfeld, 2023)).

The example of the "global war on tobacco" is a perfect case study in that respect.[3] The 2003 Framework Convention for Tobacco Control initiated a wide diffusion of anti-tobacco regulations across the globe. In reaction to this rapid spread, multinational firms in the tobacco industry challenged many of these regulations, both before domestic court and investor-state dispute panels. This makes it possible to test the theoretical predictions on the role of international law and of investor-state dispute settlement instruments on policy diffusion. To do so, a standard model of policy diffusion is adapted to capture the effect of investor-State disputes and domestic litigation events. While the spread of anti-tobacco policies follows a clear pattern of international diffusion, the empirical results confirm the intuition that this diffusion is hindered by investor-State disputes. The disruptive effect of investor-State litigation is particularly strong when countries host affiliates of the attacking MNE and when they have signed investment treaties with Investor-State Dispute Settlement (ISDS) provisions. Overall, this paper suggests that the globalization of law comes from both deliberate policy making and from the international nature of the potential plaintiffs, and of multinational firms in particular.

A more detailed review of the related literature and a description of the investor-States disputes closes the introduction (section 3.1). This background context is helpful to set up a simple game where firms decide whether or not to challenge the first adoption of a regulation anticipating possible subsequent adoption in other jurisdictions. This model is presented in section 3.2. The testable predictions are then applied to the data on tobacco control policies and related litigations, described in section 3.3. The empirical methodology and the main results follow in section 3.4. Section 3.5 concludes the paper.

3.1.1. Related literature

This paper is related to several strands of research. Most papers on investments protection focus on the impact of Investor-State Disputes Settlement provisions within investment treaties rather than on the strategic use of these arbitration panels. (Ossa et al., 2020) compare State-to-State Disputes Settlement (SSDS) and ISDS provisions in trade agreements and stresses fundamental differences in standings, in the nature of the remedy (tariff retaliation or cash compensation) and the remedial period (retrospective or prospective). (Janeba, 2016) describes the condition under which ISDS can bring about regulatory chill and finds that "frivolous" arbitration and poor qual-

[3] The expression "global war on tobacco" is borrowed from Heather Wipfli's book (War, 2015).

ity of courts may generate under-regulation but also points out the risk of under-investment in case of the absence of a commitment device. (Schjelderup and Stähler, 2020) analyses the effects of ISDS when the investor is a monopolist and finds potential threats of over-investment. Following the round of re-negotiation of the Energy Charter Treaty - a multilateral investment treaty protecting investors in the energy sector -, (Horn, 2023) shows how an investment treaty should deal with stranded assets and the urgent reforms related to climate change. Yet, most of these papers restrict their analysis to a two-country world where investors from one country own assets in another country leaving aside the incentives associated with the investments in the rest of the world. Because investors typically own assets in several jurisdictions, the decision about whether to initiate an attack against a State encompasses both local and global incentives. To date, this aspect is mostly missing from the theoretical literature on investor-State relations. On the other side of the spectrum of

Second, this paper is related to the litigation literature. Because Investor-State disputes settlements mechanisms share many features in common with the American civil procedure, insights on their implications can be borrowed from the large range of literature developed around the litigation system (see (Spier, 2007) for a useful overview of the literature). (Priest and Klein, 1984) document the determinants of the selection of disputes into litigation. Their core model has then been extended in a repeated game setting by (Che and Yi, 1993). In their paper, the same defendant is exposed to multiple claimants who learn from previous rulings. This generates a correlation between settlement choices. Closer to our setting, (Katz, 1990) shows that the asymmetry of information regarding the true nature of the damage can generate optimal strategies in which the defendant is ready to settle above the level of the damage. When the entry cost into litigation is not too high, there might exist a proportion of strategic lawsuits. (Deffains and Desrieux, 2015) also show that the cost-benefit analysis faced by potential frivolous plaintiff depends on the way litigation is financed.[4] Yet, in all these models, the damage is seen as only exogenous. This limitation is an important one when evaluating investor-State disputes in the policy diffusion perspective. In the existing literature, the defendant's room for maneuvre is restricted to the settlement phase, taking the initial damage as given. In the case of regulations, the damage incurred by firms is not the result of an accidental event but corresponds to a conscious decision from policy-makers. In contrast to this strand of the literature, this paper highlights States' regulation choices and links it to the patterns of international policy diffusion. In this respect, this

[4]"Frivolous litigation" and "strategic lawsuits" share a lot in common. In both cases, the plaintiff litigate in spite of having a negative expected outcome. In the first case, the plaintiff seeks monetary compensation at the settlement stage while in the second case, the plaintiff try to avoid subsequent damage.

paper also talks to the growing literature on the political economy of globalization and strategic behavior of firms and States in the global economy. (Blanga-Gubbay et al., 2020) show how firms strategically lobby for trade deals in the US suggesting that the regulatory environment of corporations is partly endogenous. States might also engage into trade disputes in a strategic way ((Conconi et al., 2017)).

Beyond the numerous papers investing the legal, historical and political determinants of international trade patterns (see (Head and Mayer, 2014) for a useful summary), more recent papers use the structure of the gravity equation to compares the depth of integration between countries. (Head and Mayer, 2021) for instance compare the degree of federation of US States and of European Union member States using a gravity framework. However, this strand of the international economic literature mainly focuses on the consequences rather than the causes of countries' integration. An important body of the political science literature is devoted to the determinants of policy diffusion. From a statistical standpoint, tools have been developed to understand the determinants of the spread of policies. Borrowed from the spatial economics, the diffusion of policies can be studied through spatial matrices, where the adoption of a policy in a given country can be explained by previous adoption in surrounding countries at an intensity that depends on a variety of determinants. (e.g. (Linsenmeier et al., 2023) for carbon taxes or (Laffitte, 2023) for tax incentives). (Volden, 2006) uses the country-pair dimension, the directed-dyad approach, in order to take into account the success of a policy in the origin country on the subsequent adoption in a destination country. Yet, little theoretical foundation has been proposed to explain policy diffusion. Different policy diffusion channels have emerged from the political science literature: emulation, competition, learning and coercion. In their review of the policy diffusion studies, (Graham et al., 2013) also distinguish the different actors of policy diffusion: the internal actors, the external actors and the go-betweens, acting across multiple jurisdictions. In this respect, multinational firms appear as important, but remain relatively under-studied although they have been proved to be important drivers of norm diffusion ((Tang and Zhang, 2021)). With the notable exception of (Shipan and Volden, 2008), these papers do not provide formal theories of policy diffusion. In the present paper, we look at how the precedents arising from international private law may act as a signal for the implementability of a policy. A simple game between a multinational firm and the jurisdiction in which it owns affiliates delivers testable predictions on the diffusion of policies.

Finally, and closer to our work, two papers have tried to test the regulatory chill hypothesis empirically. (Moehlecke et al., 2023) do so by reviewing a sub-sample of contested regulations

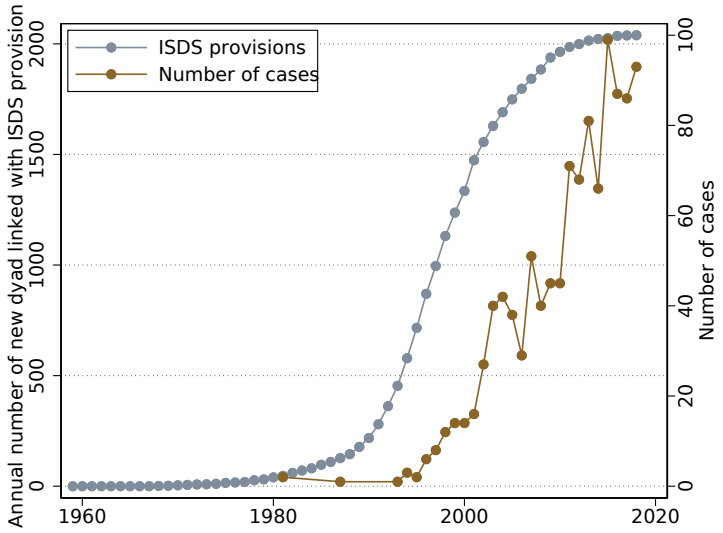
where the arbitrators ruled in favor of the State. In some cases, the State nonetheless removed the contested regulation, suggesting a decrease of their regulatory expectations. A key insight of their paper is that this pattern is more likely observed when the country of the investor and the host country participate in a deeply integrated global value chain. (Delpeuch, 2022) presents evidence of reduction of the effective taxation of foreign affiliates compared to domestic firms following tax disputes. (Moehlecke, 2019) is the first to use data on tobacco regulations and to investigate the consequences of Philip Morris' attacks against Uruguay and Australia. She finds that the speed of adoption of the policy is reduced when targeted by lawsuits. This result is consistent with qualitative evidence suggesting a form of regulatory chill. Compared to her work, the present paper identifies, using a formal model, how the current investment protection might create incentives for a given investor to challenge the regulations. In addition, an alternative empirical method is proposed, inspired by the policy diffusion literature.

3.1.2. History and definition of ISDS

Investor-States Disputes Settlement mechanisms are private tribunals where investors (claimant) can sue governments (respondent) breaching international investment treaties linking their country of origin and the jurisdiction of their investment. The legal basis of ISDS is therefore found in international agreements: bilateral investment treaties (BIT), international agreements (e.g. the Energy Charter Treaty in the energy sector) or deep free-trade agreements (e.g NAFTA). Historically, the raison-d'être of the inclusion of ISDS-provisions in international agreement was to protect investors from expropriations and to foster foreign direct investments in countries with weak institutions. ISDS provisions in international treaties have mushroomed since the 70s. Figure 3.1 depicts a fast increase in the number of dyads bound by an agreement with ISDS instruments in the 90s. In 2018, ISDS provisions appeared in investment treaties for more than two thousand country-pairs. As a consequence, the number of ISDS cases actually brought before courts has grown at a fast pace over the past fifty years. This fast increase of cases is also explained by the increasingly large scope of potential disputes covered by investment treaties. While the clause protecting investors against "direct expropriation" finds a natural justification and an easy interpretation, the inclusion of the "indirect expropriation" clause as well as the "fair and equitable treatment" clause are much broader and leave more space for interpretation.

ISDS can be used on top of cases brought before local courts and are considered as more favorable to investors because the expected compensations are higher than local ones and since the one-size-fit-all aspect of ISDS is a way for MNEs to get rid of local legal features. The outcome of ISDS

Fig. 3.1. Cumulative number of ISDS provisions and ISDS cases



Note : The number of ISDS provisons included in investment treaties are presented on the left axis and the number of ISDS cases on the right axis. Data on ISDS provision are taken from the UNCTAD International Investment Agreements Mapping project. Data on ISDS are taken from the UNCTAD ISDS database.

cases is rather unpredictable. As of 2020, 51% of concluded cases were decided in favor of States, discontinued or withdrawn and 49% decided in favor of investors or settled (implying a private arrangement between States and the investor) ((UNCTAD, 2021)). inally, it is worth mentioning that, contrary to public courts, both parties need to pay tribunal costs in addition to the legal fees. On top of the compensation (if any), the final verdict includes a split of these costs. For instance, arbitrators can dismiss all claims but can equally share the tribunal costs and let both parties pay their legal fees. The jury can also decide that all costs (tribunal and legal costs) should be borne by the claimant or the respondent. A detail of the amount and the split of these costs is provided for a sub-sample of the cases in appendix 3.7.3.

3.2. Litigations and States' incentives to regulate: a simple model

3.2.1. Model set-up

Simple model of Investor-State litigation. In this section, we present a simple interaction game between a multinational entreprise (MNE) and the two jurisdictions (S_1 and S_2) in which this MNE operates. Following the example of the tobacco industry, we consider an industry where the activity of the multinational firms has a negative externality in both jurisdictions. The

adoption of regulation r yields a cost $-R$ ($R > 0$) to the firm and a welfare gain V ($V > 0$) to the adopting State. State i can adopt regulation r ($\pi_i(r) = 1$) at the risk of facing regulatory arbitration before an Investor-State arbitration panel. When a firm decides to launch a dispute against a country, the plaintiff firm faces a fixed legal cost (lawyers and tribunal fees) c while the defendant State pays a fixed amount d.

Investors' compensations and expected pay-offs. In each State $i \in \{1, 2\}$, the multinational draws a probability of winning the case in that jursidiction. This probability of winning against country i can be high ($p_{K,i} = p_{H,i}$) or low ($p_{K,i} = p_{L,i}$). For simplicity, we refer to the outcome of this draw as an "MNE of high ($K = H$) or low ($K = L$) type". An important assumption relates to the probability of winning the case and the potential compensation. We assume that the expected pay-off of litigating is null when the probability of winning is high but negative when the probability of winning is low. This way to sketch the expected outcome of the firms is a conservative one. In particular, it rules out situations where the firm could have incentives to litigate for pecuniary motives and only focuses on cases where firms can, at best, expect a compensation corresponding to the damage suffered as well as a reimbursement of their legal expenses and tribunal fees.[5] It is however supported by the rare evidences on ISDS outcomes. Tables 3.9 in appendix 3.7.3 shows that when claimants win, they get reimbursed for a third of their legal costs on top of the main compensation. Therefore, even with a high probability of winning a case, MNEs' expected pay-off following a damage is unlikely to be positive. Table 3.1 summarizes the expected pay-off, $Y_{K,i}$ in case of regulation for a firm of type K in State i ($\mathbb{E}_{K,i}\left[Y_{K,i}; \pi_i(r) = 1\right]$) for the firm of type K in country i.

Table 3.1: Firm's expected pay-offs for low and high types

$\mathbb{E}_{K,i}\left[Y_{K,i}; \pi_i(r) = 1\right]$	Attack	Don't Attack
K=L	$-R - c$	$-R$
K=H	0	$-R$

[5]Because ISDS are private courts, judges are paid by the parties. When the panel render the judgment, legal expenses and tribunal fees can be assigned to the plaintiff or the claimant. Alternatively, the jury can decides that these costs are to be equally split between the parties.

Legal integration. The two country-specific probabilities are jointly drawn by the firm which privately knowns the outcome of this draw. States only know the ex-ante probabilities associated with the four possible draws. Matrix M_1 describes these probabilities:

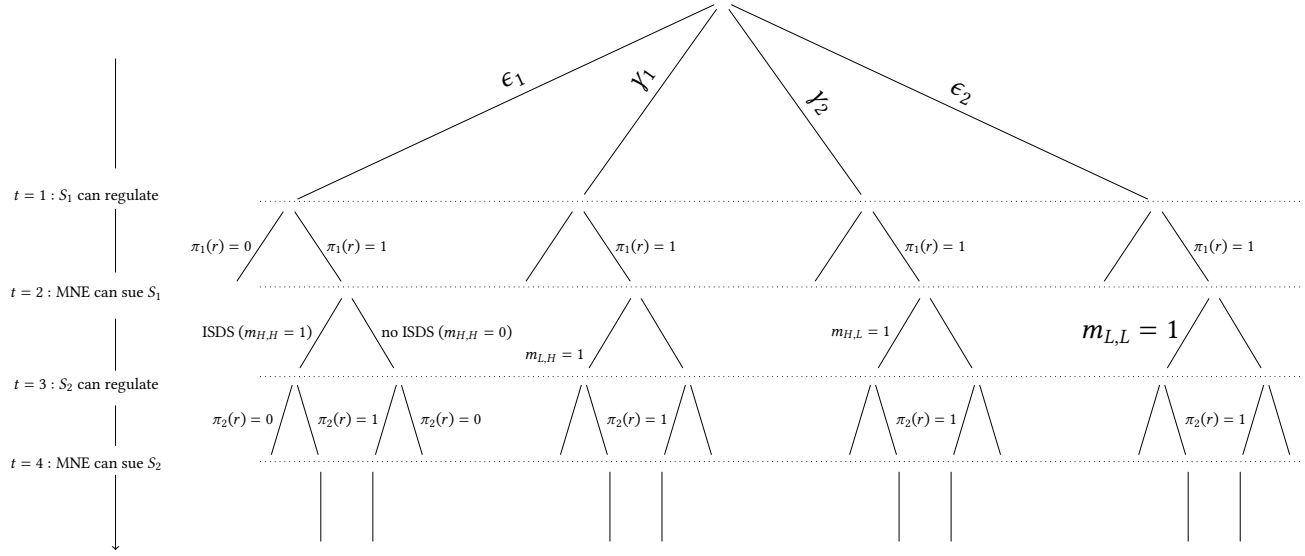
$$M_1 = \begin{pmatrix} \mathbb{P}(\{H,H\}) & \mathbb{P}(\{H,L\}) \\ \mathbb{P}(\{L,H\}) & \mathbb{P}(\{L,L\}) \end{pmatrix} = \begin{pmatrix} \epsilon_1 & \gamma_1 \\ \gamma_2 & \epsilon_2 \end{pmatrix}$$

Note that this matrix can be interpreted as the degree of global legal integration. In the extreme case where $\gamma_1 = \gamma_2 = 0$, the probability of winning the case is always the same in the two countries, suggesting that the legal basis is exactly the same in both countries. This can be the case when the two countries have the same set of international treaties such that the MNE can make use of the exact same clauses when suing S_1 or S_2. To the contrary, when $\epsilon_1\epsilon_2 = \gamma_1\gamma_2$, the matrix describe legal autarky. To see this, note that the degree of legal integration between the two countries is described by extend to which the absolute probability of the MNE being of a type K in a country i is different from the probability of being of type K in country i conditional of being of type K in country j. By Bayes rules, it can be shown that whenever $(\epsilon_1\epsilon_2 - \gamma_1\gamma_2) > 0$ the conditional probability is higher than the absolute one, stressing a positive correlation between firms' type across countries. We therefore define it as the degree of legal globalization. In practice, the correlation between the legal means of an MNE in two different countries is mostly governed by the bilateral investment treaties signed by the two countries. In the case where the two countries signed investment treaties with the same clauses and the same partners, the firm has access to same legal basis in the two countries and would therefore form similar expectations in case of the adoption of an adverse policy in these two jurisdictions. To the contrary, if one of the two countries never ratified such investment treaty, the initiation and the outcome of an ISDS case in the other country does not bring any information to that country. As it shall be clearer below, within the network of an MNE, the extend to which countries can learn from previous litigation is crucial in understanding the policy diffusion dynamics but also the strategic behavior of MNEs.

Timing of the model and decision tree. At the beginning of the game, the firm already operates and produces in the two countries. At time $t = 0$, the firms jointly draws its type in country 1 and 2. At time $t = 1$ (first stage) State 1 (S_1) decides whether to regulate. In case of adoption, at time $t = 2$ (second stage), the firm decides whether to challenge the regulation adopted by S_1. At time $t = 3$, (third stage) the second State S_2 observes the litigation opposing S_1 and the firm and decides whether to regulate. At time $t = 4$ (fourth stage) the firm decides to litigate against S_2 if

the latter adopted the regulation. Finally, at the last stage of the game, the outcome of the cases are decided and made public.

Fig. 3.2. Timing and decision tree



3.2.2. Backward induction with pure strategies

Stage 4: Litigation against S_2. The last Stage of the game is trivial. As shown in table 3.1, in expectation, a firm with a high probability of winning is always better-off challenging the regulation than accepting it without dispute and vice-versa $\left(\mathbb{E}\left[R_H^A\right] > \mathbb{E}\left[R_H^{NA}\right]\right)$. Therefore, the MNE will always sue State 2 with a high type drawn against against S_2 (left hand side of the tree shown in figure 3.2) and don't sue otherwise (right hand side of the tree).

Stage 3: Regulation in S_2**.** In stage 3, State 2 decides whether or not to adopt the regulation. State 2 is informed about (a) whether or not State 1 adopted the regulation in Stage 1 and, in case of adoption by State 1, (b) whether the MNE launched an ISDS case against State 1. Since State 2 anticipates the fact that it would only be sued if the MNE has high probability of winning in its jurisdiction, State 2's expected pay-off of regulating writes:

$$\mathbb{E}^{S_2}\left[\pi_2(r) = 1\right] = \begin{cases} V - \Omega_1\left(p_{2,H}R + d\right), & \text{in case of litigation against } S_1 \\ V - \Omega_0\left(p_{2,H}R + d\right), & \text{otherwise} \end{cases}$$

where Ω_1 is the conditional probability that the MNE sued S_1 while having a high probability of winning against S_2 ($\Omega_1 = \mathbb{P}\left(k2 = H | S_1 \text{ was sued}\right)$) and Ω_0, the conditional probability that the MNE did not sue S_1 while having a high probability of winning against S_2 ($\Omega_0 = \mathbb{P}\left(k2 = H | S_1 \text{ not sued}\right)$). Let Ω^* be the limiting probability of the MNE having high probability of winning against S_2 at

which the State is indifferent between regulating (and risking an ISDS attack) and not when a litigation has been observed in Stage 2. From the above equation, $\Omega^* \equiv \frac{V}{p_{2,H}R+d}$. Following (Katz, 1990), we define σ_2 as a variable determining the S_2's strategy at stage 3: $\sigma_2 = 0$ if $\Omega_1 > \Omega_1^*$ and $\sigma_2 = 1$ if $\Omega_1 \leq \Omega_1^*$.

Stage 2: Litigation against S_1. Before turning to the optimal strategies adopted by the MNE against State 1, note that Ω_1 can be re-written using Baye's law as:

$$\Omega_1 = \frac{\epsilon_1 m_{H,H} + \gamma_2 m_{L,H}}{\epsilon_1 m_{H,H} + \gamma_2 m_{L,H} + \gamma_1 m_{H,L} + \epsilon_2 m_{L,L}} \tag{3.1}$$

where $m_{i1,i2}$ is the probability that S_1 has been sued conditional on the MNE having probability $p_{1,i}$ and $p_{2,i}$ to win against S_1 and S_2 respectively. The threshold level Ω^* where the State 2 is indifferent between regulating or not can be mapped into a set of four corresponding strategies $\{m_{H,H}^*, m_{H,L}^*, m_{L,H}^*, m_{L,L}^*\}$. In order to determine these optimal strategies for the firm, the four possible states of nature have to be distinguished.

For each $(p_{1,i}, p_{2,i})$ pair, the firm decides whether or not to challenge S_1 by maximizing its two-period expected pay-off.

$$\begin{aligned}\mathbb{E}_{k1,k2}[Y_1 + Y_2] = &\underbrace{m_{k1,k2}\left(\mathbb{E}_{K,1}[Y_1; \pi_1(r) = 1] + \mathbb{1}(\Omega_1 < \Omega^*; m_{k1,k2})\mathbb{E}_{K,2}[Y_2; \pi_2(r) = 1]\right)}_{\text{2-period expected pay-off when S1 is sued}} \\ &+ \underbrace{(1 - m_{k1,k2})\left(-R + \mathbb{1}(\Omega_0 < \Omega^*; m_{k1,k2})\mathbb{E}_{K,2}[Y_2; \pi_2(r) = 1]\right)}_{\text{2-period expected pay-off when S1 is not sued}}\end{aligned}$$

In the cases where the firm is of high type against S_2, the optimal strategies for MNE follow the intuition and the firm would only consider its direct interest against S_1. To see this, note indeed that the only motive that could push the two-period strategy away from its first-period optimal decision (i.e. attacking $K_1 = H$ and not when $K_1 = L$) would stems from the deterrence effect signaled to S_2 by this deviation form first-period decision. Yet, because the firm has high probability of winning against S_2, it has no interest in deviating in the first stage since it has a positive expectation of ISDS compensation against S_2 (null overall expected pay-off against S_2, including the potential regulation). In these cases, the firm does not need to "invest in its reputation". It follows that a firm having high probability of winning against both S_1 and S_2 would always litigate when S_1 adopts a policy ($m_{H,H}^* = 1$) and that a firm with low probability of winning against S_1 but with a high probability of winning against S_2 would never initiate attack against S_1 because of its negative expected cost to do so ($m_{L,H}^* = 0$). More subtle - and interesting

- are the strategies adopted by the firm when having a low probability of winning against S_2. In these cases, the firm might want to anticipate the regulatory risk faced against S_2 by signaling to S_2 a high probability of winning Investor-State disputes. In these cases, litigation against S_1 can be motivated either (i) by a compensatory motive (short-run expected compensation against S_1) and/or (ii) by a deterrence motive (distortion of S_2 beliefs about the firm's type and therefore a reduction in the probability of regulation).[6]

In the cases where the firm has a low probability of winning against the second State, the firm might be willing to depart from its firm-period interest to modify State 2's beliefs and reduce S_2's probability to regulate. In this subsection, only pure strategies are considered. The two strategies $m^*_{H,L}$ and $m^*_{L,L}$ are jointly determined since the optimal strategy whether or not to attack S_1 under one the two draw determines the beliefs that S_2 will form over both cases. In each case, the firm compares the two-period expected pay-offs under with (Ω_1) and without (Ω_0) litigation against S_1 Replacing the optimal strategies in the two other cases in equation 3.1, one can solve for $(m^*_{L,L}, m^*_{H,L})$.

$$\Omega^*_1(m^*_{L,L}, m^*_{H,L}) = \frac{\epsilon_1}{\epsilon_1 + \gamma_1 + \gamma_2 m^*_{H,L} + \epsilon_2 m^*_{L,L}}$$
$$\Omega^*_0(m^*_{L,L}, m^*_{H,L}) = \frac{\gamma_2}{\gamma_2(1 - m^*_{H,L}) + \epsilon_2(1 - m^*_{L,L})}$$

Crossing the four possible combinations of $(m^*_{L,L}, m^*_{H,L})$ pairs shows that, regardless of the optimal strategies $m^*_{L,L}$, the firm always has incentives to litigate in the first period whenever it has high probability of winning in the first place. This is because the cost of accepting the regulation while having a high chance to get compensated against S_1 can, at best, deter S_2 from regulating. By refusing to litigate in the first period, the firm only switches the regulatory cost from S_1 to S_2. Given that $m^*_{H,L} = 1$, a firm with a low type against both States (L,L), compares its two-period pay-off with and without litigation.

$$m^*_{L,L} = \begin{cases} 1, & \text{if } \dfrac{\gamma_2}{\gamma_2 + \epsilon_2} \leq \dfrac{V}{p_{2,H}R + d} \leq \dfrac{\epsilon_1}{1 - \gamma_2} \\ 0, & \text{otherwise} \end{cases} \tag{3.2}$$

Equation 3.2 shows that under some conditions regarding the relative values of the cost associated

[6] This motives is very close to the "frivolous litigation" literature. The difference is that frivolous claims relates to litigation without merits but seeking for compensation at the settlement stage. Here, the focus is shifted away from the settlement and oriented towards the decision whether or not to regulate.

with ISDS ($p_{2,H}R+d$) and the regulation's welfare (V), the MNE can engage into arbitration against S_1 in spite of its low probability of winning against both States. Proposition 3.2.1 clarifies the condition under which strategic litigation may arise and their implication on policy diffusion.

Theorem 3.2.1. *Strategic litigation arises when the welfare associated with the policy (i) exceeds the expected litigation costs in absence of precedents and (ii) is inferior to States' expected costs of litigations when a dispute has been observed. Strategic litigation reduces the probability of policy diffusion.*

To see this, first note that the first part of the condition of equation 3.2 can be rewritten as $\mathbb{P}(H_2|L_1)\left(Rp_{2,H}+d\right) \leq V$. When the welfare is greater than the posterior expected costs of litigation, the firm does not engage into strategic lawsuits since the bluffing effect is not strong enougth to prevent litigations. In between these two cases, the firm engages in strategic lawsuits since the event of a dispute against S_1 deters regulation in S_2 at the equilibrium.[7] Indeed, the State 2's beliefs about the MNE's being of high type under the two strategies are given is given by $\Omega_1(m_{L,L}=1) = \dfrac{\epsilon_1}{\epsilon_1+\epsilon_2+\gamma_1}$ and $\Omega_0(m_{L,L}=0) = \dfrac{\gamma_2}{\gamma_2+\epsilon_2}$. These beliefs directly determine the probability of policy diffusion under the two strategies as S_2 regulate if and only if this beliefs is lower than the threshold Ω^*. Events of strategic litigation are associated with $\Omega_1(m_{L,L}=1)$ being greater than $\Omega_0(m_{L,L}=0)$ and therefore with a lower probability of policy adoption.

Note that in case where $\Omega_1(m_{L,L}=1) \leq \Omega_0(m_{L,L}=0)$ strategic lawsuits never occur. State 2's beliefs depend upon the exogenous probability of the firm's draws. Therefore, the composition of the matrix M_1 is key for describing the existence and the consequences of strategic litigations. Expressing the comparison between the beliefs under the two strategies of the firm in terms of the exogeneous probability of draws, strategic litigation occur if $(\epsilon_1\epsilon_2 - \gamma_1\gamma_2) > \gamma_2\epsilon_2$. Remember that the difference between the product of the diagonal of the matrix is to be interpreted as a measure of legal integration. Proposition 3.2.2 summarizes the main takeaway of this comparative static.

Theorem 3.2.2. *Strategic litigation only arise under a given degree of legal globalization. Legal globalization increases the extend to which policy diffusion is hindered by Investor-State disputes.*

The first part of proposition 3.2.2 directly stems from the comparison between State 2's beliefs under the two alternative strategies of a firm with low type in both States as explained above. The second part of the proposition, can be interpreted as an increase of the space in which the

[7] This result can be thought of an extansion of (Katz, 1990)'s first proposition with imperfect correlation between types. As in his paper, the legal costs of the firm c do not determine the optimal strategy of the firm as long as they do not exceed the amount of the damage, as shown in Appendix 3.7.1.

firm engage into strategic disputes, resulting in a increase of the space where S_2 refrain from regulating while S_1 adopted the regulation at stage 1.

Stage 1. Regulation in S_1. In the first stage of the game, S_1 compares its utility of adopting the regulation to the legal risk associated with this adoption. Since S_1 does not internalize S_2's utility, it only maximizes the expected utility of adopting the regulation. Contrary to S_2, S_1 does not observe any prior decision and therefore regulate only based on the prior and exogenous probabilities of MNE's type but takes into account the possibility of strategic lawsuits $m^*_{L,L}$. S_1's expected utility of adopting the regulation writes:

$$\mathbb{E}^{S_1}\left[\pi_1(r)=1\right] = \underbrace{(\epsilon_1+\gamma_1)\left(V-(p_{1,H}R+d)\right)}_{\text{Bona Fide ISDS}} + \underbrace{m^*_{L,L}\epsilon_2\left(V-(p_{1,L}R+d)\right)}_{\text{Strategic lawsuits}} + \underbrace{(1-m^*_{L,L})\epsilon_2\left(V\right)}_{\text{No ISDS}}$$

As for stage 3, σ_1 is a variable determining S_1's strategy at stage 1: $\sigma_1 = 0$ if $\mathbb{E}^{S_1}\left[\pi_1(r)=1\right] < 0$ and $\sigma_1 = 1$ otherwise. The equilibrium is determined by the joint decision of strategies $(\sigma_1, m^*_{L,L})$.

3.2.3. Mixed strategies

So far, we only considered pure strategies from both the State and the firm perspective. While mixed strategies of policy adoption from the State perspective is hard to conceive, mixed strategies make more sense from the MNE perspective. First, while this model describes an interaction game between one plaintiff and two defendants, one could think of the plaintiffs as a continuum of investors where only some multinational firms would engage into litigation. Alternatively, given that States typically adopt bundle of policies, the MNE could decide to attack a only a share of policies adopted by countries. This is what happened in Uruguay, where Philip Morris attacked two out of the 6 policies adopted by the country. In appendix 3.7.1, the case where $m^*_{L,L}$ can take value between 0 and 1 is described. It yields similar predictions regarding the role of State's litigation costs and to the degree of legal globalization. In the next section, these predictions are then brought to the data on tobacco-related policies.

3.3. The example of the "Global War on Tobacco"

3.3.1. Tobacco control policy diffusion and the Framework Convention for Tobacco Control

Signed in 2003 by 168 countries in the framework of the World Health Organization, the Convention for Tobacco Control lists a set of common standards aiming at limiting the dangers of tobacco. The convention sets minimum standards and general objectives that signatory jurisdictions agree to follow. The convention is composed of 22 articles covering a wide range of public policies including prevention, health information and advertising regulations.[8] This convention entered into force on February 2005, which initiated a rapid and global diffusion of anti-tobacco policies. In this respect, it constitutes a perfect case-study of an international policy diffusion since the 22 actions plans developed in the convention translated into comparable regulations gradually adopted by a high numbers of countries.

Beyond its impact on the tobacco pandemics, the Framework Convention for Tobacco Control is the world's first public health treaty, achieves the full potential of international law and was proved powerful in disseminating policies.[9] Impact Assessment of the WHO FCTC confirms that the Convention was key in the implementation of policies across the globe and did result in lower on tobacco consumption and prevalence. Yet, the Convention only sets baseline measures and general objectives. As a result, not all signatory countries adopted the same set of regulation. Moreover, even when the same regulations are adopted, the pace at which these policies were implemented typically varies, shaping patterns of policy diffusion. This heterogeneity in the speed and the set of policies adopted by countries is a useful source of variation and help understanding the role of litigation in the policy diffusion patterns.

The diffusion of anti-tobacco regulations has been heavily scrutinized by the civil society, international fora and scholars. The first and main source of data used in this paper to track policy adoption is the World Health Organization's Global Health Observatory (GHO).[10] This gathers

[8] The convention also includes guidelines on passive smoking with reduction of smoking in public places (restaurants, public transports, parks...) as well as excise taxes on tobacco or limiting the strength of tobacco-related lobby.

[9] By opposition to recommendation, conventions are binding instruments. Moreover, beyond its binding legal impacts, the *modus operandi* of the Convention is considered as one of the first international evidence-based policy making.

[10] https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/gho-tobacco-control-warn-about-the-dangers-of-tobacco

policy adoption for 21 policies from 2006 onwards. Table 3.8 in appendix 3.7.2 describes these regulations. Since this dataset is updated only every two years, it can be completed from external sources. The website Tobacco Control Laws provides a very useful source of information since it systematically records legislative acts aimed at curbing the tobacco pandemics. Lastly, for the overlapping policies and years, we make sure that our dataset is consistent with the one used by (Moehlecke, 2019) in her study on the regulatory chill in the tobacco industry. The result is a working dataset recording the monthly adoption of 21 policies for 222 jurisdictions between the January 2006 and the December 2019.

3.3.2. Investor-States disputes and domestic litigations

From the tobacco industry's perspective, the Convention opened a new regulatory area. The website Tobacco Control Law also records the litigations opposing firms and States. The number of litigations brought by the tobacco industry against States increased significantly following the entry into force of the Convention. Figure 3.12 in appendix 3.7.2 shows the annual number of cases brought before local courts. The number of litigations spiked in 2016 with 11 cases brought against tobacco-control policies (8 under domestic law and 3 under international investment law) around the globe. In spite of the globalized nature of this policy diffusion, most of these cases were brought to domestic courts not to Investor-State dispute settlement. Philip Morris International made its first use of Investor-States dispute settlement mechanism in 2010 against the adoption by Uruguay of two policies suggested by the Convention: (i) the Single Presentation Requirement limiting each cigarette brand to just a single variety[11] and (ii) the obligation of health warnings covering more than 80% of the package size. In 2011, Philip Morris International challenged the plain packaging policy adopted by the Australian government. These cases were ultimately dismissed in 2016 and 2015 respectively. Yet, anecdotal and qualitative evidences suggest that these cases had a powerful deterrent effect on subsequent adoptions in other countries, consistently with the theoretical framework ((Moehlecke, 2019)).

Figure 3.3 presents the pace of policy adoption for two policies challenged by Philip Morris: the warning size imposed by Uruguay and the plain packaging imposed by Australia. We compare these two policies, with policies never challenged before ISDS courts. On the left, the figure shows that the adoption of regulation imposing the warning size to take more than 80% of the packaging might have been slowed down by the litigation but some countries followed the ex-

[11]The rational behind the Single Presentation Requirement was to avoid marketing nudges suggesting that some cigarettes are lighter, notably using colors shades.

ample of Uruguay even when the case was still pending. The effect of the ISDS case is clearer of the adoption of plain packaging regulation. The absence of subsequent adoption following the litigation against the first adoption of the plain packaging regulation seems to suggest that countries waited for the outcome of the case before adopting similar regulations. The ruling in favor of Australia in 2015 is associated with an adoption pace similar to the one observed for regulation against misleading terms.

Fig. 3.3. Comparison across policies

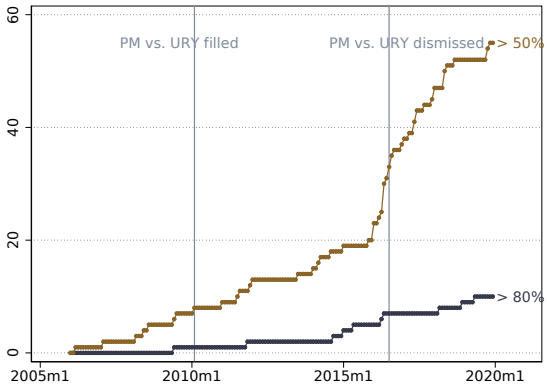


Fig. 3.4. Warning size

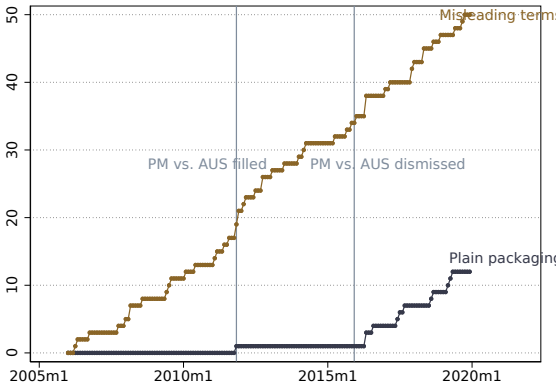


Fig. 3.5. Marketing restriction

Comparisons across policies are insightful to gauge the deterrence effect of Investor-State disputes. Yet, because policies have ex-ante differences and that MNEs do not randomly attack policies, the speed at which policies are adopted following an ISDS attack can also come from endogenous determinants. Another way to assess the way ISDS attacks shape policy diffusion is to compare instances where multinational firms sued countries before domestic courts with ISDS events. Adding events of domestic lawsuits initiated by multinational firms (green lines in figure 3.6) shows that the pace of policy adoption does not follow a very clear pattern with respect to these events of litigation. Still, the most recent attack against the plain package regulation occurred in Belgium and also corresponds to a plateau of the number of adopting regulation but this must be taken with caution given that the data on policy adoption around 2020 is more recent and polluted by the Covid-19 pandemics.

Fig. 3.6. Comparison within policies

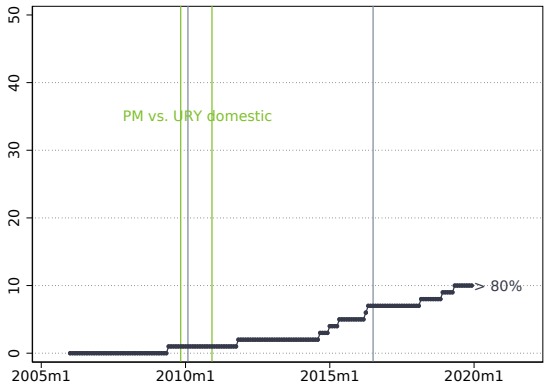


Fig. 3.7. Warning size

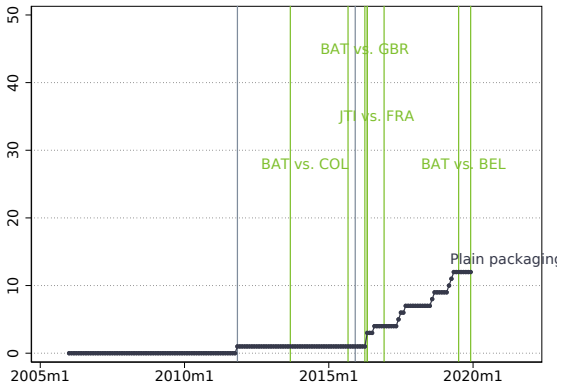


Fig. 3.8. Marketing restriction

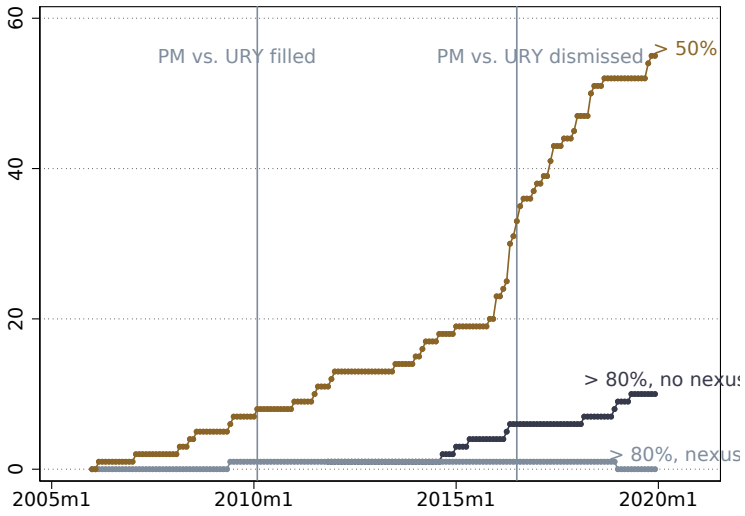
3.3.3. MNEs' affiliates network, investment treaties and legal nexus

These Investor-State disputes were made possible by the existence of bilateral investment treaty signed between Uruguay and Switzerland for the first case and between Hong-Hong and Australia in the second case. Counter-intuitively, in both cases Philip Morris did not use bilateral treaty signed by the US. Instead, the firm used intermediate entities - respectively Philip Morris International SA (registered in Switzerland) and Philip Morris Asia Limited (registered in Honk-Hong) - which themselves had ownership links over the local affiliates. The coexistence of an investment treaty and of pre-existing investments is what create the legal nexus needed to make use of ISDS instruments. Among the entities owing investments affected by a given regulation, the firm is therefore able to cherry pick the investment treaty containing the most advantageous clauses (see (Thrall, 2021) for an analysis of the ISDS-related treaty shopping). Going back to the theoretical framework, this is certainly the best way to think about probability of winning ISDS claim. In addition, the legal correlation between two countries hosting the same investor can be thought of as the proximity between the portfolio of investment treaties signed with third countries.

In order to test the prediction of the game presented in section 3.2, a dummy variable is built and takes value 1 when a country hosts an affiliate from Philip Morris and when this country signed

an investment treaty with a country hosting a legal entity owning an affiliate in its soil. Data on investment treaties are gathered from the UNCTAD's IIA Mapping Project and structured into a dyadic panel dataset. For each year and every country-pair, a dummy variable indicates whether an investment treaty exists and if so, which clauses are included in the scope of that treaty. In particular, the existence of an Investor-State Dispute Settlement mechanism is filled out. Figure 3.1 presented in section 3.1 shows the rapid spread of investment treaties over time. In addition, the network of ownership of Philip Morris from 2008 to 2019 is reconstructed from various data sources. The Orbis dataset contains information on contemporaneous ownership links. It is then combined with historical data on affiliates of US-MNEs provided by the Edgar dataset. The governmental archives provide lists of affiliates at three points in time (2006, 2011 and 2016). Finally, we rely on the Open Corporate initiative to track the evolution of the affiliates identified with the two previous datasets. Overall, this data shows that in 10% of the cases, countries both host an investment from Philip Morris and signed an investment treaty containing ISDS clauses. This corresponds to the cases where States do face the risk of litigation in case of policy adoption. When the nexus created by Japan Tobacco International (JTI) and British American Tobacco (BAT) are added, 30% of the country-year instances are covered by investment protection through ISDS. This number is likely to be a lower bound given the limitation of the data on the ownership structure for BAT and JTI. With the information about the legal nexus in hand, it is possible to distinguish adoptions of litigated policies between two groups of countries, with and without legal nexus vis-à-vis the plaintiff. Figure 3.9 extends figure 3.3 in that line. It reveals that countries that adopted the regulation on warning size ($\geq$80%) in the time laps where the regulation was challenged by Philip Morris in Uruguay did not have legal nexus and therefore did not risk similar claim.

Fig. 3.9. ISDS effect and legal nexus



3.4. Investor-State Disputes as hindrance to policy diffusion ?

3.4.1. Methodology and spatial matrices

Beyond the graphical insights, the data on policy adoption, on lawsuits and on legal nexus are then bundled together in a working dataset. The empirical literature on policy diffusion has developed various ways to identify policy diffusion pattern. First used within the context of federal states, country-pair level datasets can be exploited to understand whether the adoption and/or the success of a policy at time t by one country of the dyad is followed by an adoption of that policy by the partner country at time $t + 1$ ((Volden, 2006)). Taking into consideration the fact that the adoption of a policy by a State has a stronger effect on its neighbors than on other partners, the spatial dimension of policy diffusion can be captured by proximity weights.[12] Spatial matrices summarize the heterogeneous effect that the adoption of a policy can have on regulation incentives in surrounding jurisdictions.[13] Along this line, the adoption of a policy p by a country o in month m of year y is explained by estimating the following equation:

$$\mathbb{1}_{\text{adoption}_{opmy}} = \alpha + \beta_1 W_{op(m-6)} + \beta_2 W^{isds}_{op(m-6)} + \delta X_{o(y-1)} + \mu_t + \mu_{op} + \epsilon_{opy} \tag{3.3}$$

[12]Here, the empirical literature on policy diffusion shares a lot in common with the gravity equation used in trade as it relies on the bilateral proximity ofcountries beyond geography.

[13]Other ways of detecting diffusion pattern are developed around algorithmic tools: (Desmarais et al., 2015), (Elkink and Grund, 2021)

Where the two spatial lag matrices $W_{op(m-6)}$ and $W^{isds}_{op(m-6)}$ are constructed as:

$$\begin{cases} W_{op(m-6)} = \dfrac{\sum_{d\neq o}^{N} w_{od(y-1)} \times \mathbb{1}_{\text{adoption}_{dp(m-6)}}}{\sum_{d\neq o}^{N} w_{od(y-1)}} \\ W^{isds}_{op(m-6)} = \dfrac{\sum_{d\neq o}^{N} w_{od(y-1)} \times \mathbb{1}_{\text{ISDS}_{dp(m-6)}}}{\sum_{d\neq o}^{N} w_{od(y-1)}} \end{cases}$$

The weight $w_{od(t-1)}$ is based on the bilateral trade between country o and country d. Informed by the empirical trade literature and the gravity equation, bilateral trade summarizes economic proximity and provides therefore a good weighting metric. In table 3.6, additional weights are tested.$\mathbb{1}_{\text{adoption}_{dp(m-6)}}$ takes value 1 when country d has adopted policy p at time $(m-6)$ and $\mathbb{1}_{\text{ISDS}_{dp(m-6)}}$ is a dummy variable taking 1 when a policy is challenged before an ISDS panel in country d at time $(m-6)$. In the three instances where policy where challenged by Philip Morris in a ISDS panel, the case was ultimately ruled in favor of the State. Once the ISDS panel ruled in favor of State, the dummy variable takes back the value of 0. An implication of the model is that an outcome in favor of the State is not likely to boost policy adoption above its pace of a standard adoption. Indeed, an outcome in favor of State reveals perfectly the merits of firm in a given country in a similar way as an uncontested adoption does. This explains why no additional variables are added to differentiate policies that were challenged but were ultimately kept and policy adopted without disputes. $X_{o(y-1)}$ is a vector of controls including GDP, GDP per capita, governmental expenditure and measure of institutional quality are also added. Controls and spatial matrices are lagged to limit endogeneity concerns. In the baseline estimations, spatial matrices are taken with a 6-month lag while annual controls are taken with one-year lag. In table 3.5, alternative time laps for the lags are tested. μ_t and μ_{op} are year and country-policy fixed effects respectively. Including these fixed effects captures any year-specific shocks and ensures that the identification is done within policies. Alternative specifications where country-fixed effect and policy-fixed effect are imposed separately (table 3.4). The equation is estimated using a linear probability model.

3.4.2. The deterring effect of Investor-State disputes

Table 3.2 presents the baseline results. In column (1), only the policy adoption spatial lag matrix $W_{op(t-1)}$ is included in the regressors. The positive and significant coefficient capture the international diffusion of the tobacco-control policies. In column (2), the spatial lag matrix capture

the weighted exposure of policy-country pairs to past litigations $W^{isds}_{op(m-6)}$ is added. As expected, the negative and significant sign associated with the matrix shows an hindrance to the diffusion of policies when they got challenged by a firm. In column (3), the preferred specification, country-level controls are added to capture country-specific features likely to influence regulatory incentives. As suggested in the theoretical part, a very high State's idiosyncratic utility in adopting the policy reduces the sensitivity of government to strategic lawsuits. The most natural control is GDP per capita as the economic development is associated with a higher internal demand for regulation. In this specification, the disruption effect of investor-State dispute is three times larger than the diffusion effect. Column (4) suggests that GDP per capita is indeed a strong predictor of policy adoption. Regression (4) also controls for institutional features (Polity IV), country size and government expenditure. In column (5), a third matrix is added. This matrix is built in the same way as the two other matrices but records events of litigation between multinational firms and States before domestic courts. The associated coefficient is very close to zero suggesting no reaction of policy diffusion patterns to domestic litigation. The difference of the impact of MNEs' litigation before investor-State panels and domestic court on policy diffusion is striking. Consistently with the theoretical framework, the initiation of domestic cases and the legal domestic outcome are a much weaker signal from the surrounding State perspective. The correlation between the merits of a multinational firm in two different countries is much weaker based on domestic law than based on investment treaties that are widely spread and uniform across the world. While these baseline regressions cannot be interpreted in a causal way given the endogenous nature of litigation decisions, this difference between the domestic spatial matrix and the ISDS one really points in the direction of a foiling effect of Investor-State disputes on policy diffusion.

Table 3.2: Baseline

	(1)	(2)	(3)	(4)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$W_{o(m-6)}$	0.284***	0.285***	0.126***	0.126***
	(11.05)	(11.08)	(5.29)	(5.29)
$W^{\text{isds}}_{o(m-6)}$		-0.430***	-0.389**	-0.389**
		(-3.21)	(-2.47)	(-2.47)
$\text{GDP}_{o(y-1)}$			-0.0164***	-0.0164***
			(-5.31)	(-5.30)
$\text{GDP per capita}_{o(y-1)}$			0.00128**	0.00128**
			(2.01)	(2.01)
$\text{Gov expenditure}_{o(y-1)}$			0.126***	0.126***
			(9.40)	(9.40)
$\text{Polity IV}_{o(y-1)}$			-0.00988	-0.00988
			(-1.28)	(-1.28)
$W^{\text{dom}}_{o(m-6)}$				-0.000000218
				(-0.46)
Year-FE	Yes	Yes	Yes	Yes
Country X Policy-FE	Yes	Yes	Yes	Yes
Cluster	Yes	Yes	Yes	Yes
R2	0.64	0.64	0.65	0.65
Observations	673,582	673,582	518,226	518,226

Note : This table estimates the linear probability model shown by equation 3.3. W_o and W_o^{isds} are taken with 6 month lags. The controls added in column (3) and (4) are annual indicator and taken with one year lag. The GDP and government expenditure are taken from the IMF database and expressed in bilion USD and million USD respectively. Polity IV is an index measuring the level of democratization of country and taken from the Polity IV database. t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

An alternative way to test the prediction of the model that higher correlations between plaintiff's merits are associated with higher risk of strategic lawsuits and hindrance to policy diffusion is to look at the role of the legal nexus describe in section 3.3. Countries that did not sign investment treaties with ISDS clauses and/or do not host investment from multinational group from the tobacco industry are not expected to react from previous investor-State disputes. Using the ownership data collected for Japan Tobacco International, British American Tobacco and Philip Morris and the data on investment treaties, the spatial matrix of litigation is interacted with a

dummy variable indicating 1 if country *o* can *de jure* face Investor-State disputes. The baseline regression is added in column (1) for presentation purposes. In column (2), the ISDS spatial matrix is interacted with a dummy indicating a nexus with at least one of the three MNEs for which the information is collected. While the main effect remain significant, the interaction term is positive and not significant. When the dummy solely captures the presence of the attacking multinational, Philip Morris, the coefficient jumps close to -3 and is significant at the 1% level. Bearing in mind the limitation of the data on ownership structure, this result goes in the direction of the model by suggesting that countries react more strongly to previous lawsuits when facing similar legal risk than the defendant jurisdiction. It also reflects plaintiff-specific component, since this the chilling effect observed for the nexus with the attacking firm is not at play when the nexus is formed with any of the three bigger multinational group of the industry.

Table 3.3: Legal Nexus

	(1)	(2)	(3)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$W_{o(m-6)}$	0.126***	0.126***	0.126***
	(5.29)	(5.27)	(5.28)
$W^{\text{isds}}_{o(m-6)}$	-0.389**	-0.435*	-0.374**
	(-2.47)	(-1.92)	(-2.44)
$\mathbb{1}[\text{MNE presence}_{oty} \times \text{BIT} == 1]$		0.0197**	
		(2.50)	
$\mathbb{1}[\text{MNE presence}_{oty} \times \text{BIT} == 1] \times W^{\text{isds}}_{o(m-6)}$		0.153	
		(0.61)	
$\mathbb{1}[\text{PM presence}_{oty} \times \text{BIT} == 1]$			0.0301***
			(2.71)
$\mathbb{1}[\text{PM presence}_{oty} \times \text{BIT} == 1] \times W^{\text{isds}}_{o(m-6)}$			-2.964***
			(-3.38)
Year-FE	Yes	Yes	Yes
Country X Policy-FE	Yes	Yes	Yes
Cluster	Yes	Yes	Yes
Control	Yes	Yes	Yes
R2	0.65	0.65	0.65
Observations	518,226	518,226	518,226

Note : This table estimates the linear probability model shown by equation 3.3. All regressions include the set of controls for the adopting country (*o*): GDP (in Bn USD), GDP per capita, government expenditure (in Mn USD) and the Polity IV measure of democracy. In column (2), the main effect of litigation is interacted with a dummy whether at least one the three biggest MNE of the tobacco industry (Japan Tobacco International, Philipp Morris and British American Tobacco) have a presence in country *o* covered by an Investor-State Dispute Instrument. In column (3), this effect is restricted to Philip Morris. *t* statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.4.3. Robustness checks

In this subsection, we check the robustness of the results to different specification. In table 3.4, several sets of fixed effects are compared. In column (1), only year and policy fixed-effect are imposed. The coefficient remains very similar to the main regression (added in column (4) of table 3.4 to facilitate the comparison). When the policy-fixed effect is removed and replaced by a country-fixed effect, both coefficients are multiplied by two. In this regression the identification is done across policies. The increase of both coefficients suggest both a diffusion across policies and a hindrance from one policy to another. This result is not counter-intuitive given that policies are typically adopted by clusters. Some policies goes typically hand in hand. For instance, the policy imposing the presence of health warning is typically complemented with other policies refining the scope of its application, for instance by adding the obligation of including a picture. For the litigation matrix, this arguments also holds. Figure 3.3 shows that the ruling in favor of Uruguay on the regulation imposing the health warnings to represent more than 80% of the cigaret packages was also associated with a sharp increase in the number of countries adopting less ambitious regulations with a 50% threshold. In column (5) and (6) country x year-fixed effects are added to capture for any shocks affecting a country in a given year such as political changeover or information shocks in the mass-medias. These regressions are the most demanding. The coefficient of the adoption matrix remains stable and the coefficient on the litigation matrix slightly decreases in magnitude but remains significant at the 5% level.

Table 3.4: Fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$W_{o(m-6)}$	0.147***	0.251***	0.134***	0.126***	0.301***	0.194***
	(3.84)	(7.85)	(4.07)	(5.29)	(12.79)	(8.15)
$W^{\text{isds}}_{o(m-6)}$	-0.312***	-0.821***	-0.332***	-0.389**	-0.440***	-0.264**
	(-4.83)	(-3.67)	(-2.59)	(-2.47)	(-3.19)	(-2.20)
Specification	y p	y o	y o p	y op	oy op	oy op py
Cluster	Yes	Yes	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes	No	No
R2	0.09	0.17	0.20	0.65	0.71	0.71
Observations	518,226	518,226	518,226	518,226	673,582	673,582

Note : This table estimates the linear probability model shown by equation 3.3. Fixed effects included in each regression are indicated in the line "Specification": y indicate year-fixed effect, p policy-fixed effect, o adopting country-fixed effect, op is country-policy-fixed effect, py is policy-year-fixed effect and oy is country-year-fixed effect. When country-year fixed effects are added, only the two matrices W_o and W_o^{isds} are used as regressors, the other controls being absorbed by the fixed effects. t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In table 3.5, different lags are compared for the two spatial matrices. The effect is very stable between 6-months lag and 18 month lag although it shows an attenuation bias when for longer lags. The correlation coefficient increases from 0.65 to 0.72 between the 6-months lag to the 24-month lags. With longer lag, the policy diffusion coefficient (first line) gains in significance while it tends to weaken the explanatory power of the litigation effect. A possible interpretation is that the three litigations by Philip Morris are more salient signals than adoptions. As a consequence, events of litigations are more rapidly taken into account by other states while the policy adoption is a more gradual process.

Table 3.5: Lags

	(1)	(2)	(3)	(4)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$W_{c(m-i)}$	0.126***	0.132***	0.143***	0.154***
	(5.29)	(5.59)	(5.96)	(6.22)
$W^{isds}_{c(m-i)}$	-0.389**	-0.366***	-0.349***	-0.310***
	(-2.47)	(-2.76)	(-3.55)	(-4.05)
Year-FE	Yes	Yes	Yes	Yes
Country X Policy-FE	Yes	Yes	Yes	Yes
Lag	6 Months	12 Months	18 Months	24 Months
Cluster	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes
R2	0.65	0.68	0.70	0.72
Observations	518,226	515,946	495,660	475,373

Note : This table estimates the linear probability model shown by equation 3.3. All regressions include the set of controls for the adopting country with a one-year lag (o): GDP (in Bn USD), GDP per capita, government expenditure (in Mn USD) and the Polity IV measure of democracy. The number of lag for the two matrices W_o and W^{isds}_o are expressed in line "Lag". t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Lastly, the interaction game presented in section 3.2 shows that the correlation between merits of the firms in the two countries is a key determinants for the diffusion pattern of policies, especially when a regulation is challenged by a firm. So far, this degree of proximity between countries was proxied by bilateral trade since it encapsulates various legal, political and economic determinants. In table 3.6, alternative weighted matrices are compared to the baseline (column (1)). In column (2), bilateral trade is replaced by the ratio of the log of GDP of country d at the t by the log of bilateral distance od. In column (3), the proximity is simply captured by the inverse of the bilateral distance. In the last two columns, the two coefficient increases in absolute terms, keep the same sign and remain highly significant. As predicted by the gravity equation, these three measures are highly correlated and therefore result in comparable patterns.

Table 3.6: Weights

	(1)	(2)	(3)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$W_{c(m-6)}$	0.126***	0.701***	0.800***
	(5.29)	(13.86)	(14.71)
$W^{isds}_{c(m-6)}$	-0.389**	-4.069***	-4.420***
	(-2.47)	(-7.32)	(-6.92)
Year-FE	Yes	Yes	Yes
Country X Policy-FE	Yes	Yes	Yes
Weights	Bilateral trade	Gravity	Distance
Cluster	Yes	Yes	Yes
Control	Yes	Yes	Yes
R2	0.65	0.66	0.66
Observations	518,226	552,362	552,362

Note : This table estimates the linear probability model shown by equation 3.3. All regressions include the set of controls for the adopting country with a one-year lag (o): GDP (in Bn USD), GDP per capita, government expenditure (in Mn USD) and the Polity IV measure of democracy. The weights used to construct the two matrices W_o and W^{isds}_o are expressed in line "Weights". "Gravity" refers to the ratio of the log of GDP of country d and the bilateral distance od, "Distance" refers to the inverse of the geographical distance od and "Bilateral Trade", the baseline weighting, correspond to the share of export from o to d in year t. The t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.4.4. Quantification and policy implications

As (Linsenmeier et al., 2023) do in their paper on carbon tax adoption, it is insightful to get an quantitative sense of the policy diffusion mechanism. More specifically, this quantification exercise allows comparing the dissemination effect of policy adoption to the repealing effect of investor-State disputes on the hazard of adoption in surrounding countries. To do so, they use a semi-parametric Cox proportional hazard model where they identify the role of the spatial lagged matrix of policy adoption on the hazard of policy adoption. With the estimated coefficient and the matrix's weights in hand, it is possible to proceed to a back-of-the-enveloped exercise and predict the hazard within country pair. In the first two columns of table 3.7, the OLS model used throughout the paper is kept but all the coefficients are logged to get elasticities. The coefficient remains statistically significant the 5%-level and of expected sign without controls. When the (logged) controls are added, the spatial matrix of Investor-State disputes is more noisily es-

timated. Note however that these two regressions only related to the three policies that were challenged before ISDS court. Indeed for the policies that were never challenged, all cells of the spatial matrix are annulled by the 0-dummy associated with ISDS attacks. As a result, the sample size shrinks by a factor of 17. In column (3), (4) and (5) of table 3.7, we turn to the Cox proportional hazard rate modelused by (Linsenmeier et al., 2023). Since countries ratified the Framework Convention for Tobacco Control in 2005, they committed to adopt policies aiming at curbing the tobacco pandemics. It is therefore logical to look at the time these countries take to adopt a given policy rather that the mere adoption of a policy. Both with (column (4)) and without (column (3)) controls, the spatial matrix of policy adoption is positively associated with hazard of policy adoption. The coefficient is significant at the 1%-level without control and at the 5%-level with controls. As in the previous regressions, the spatial matrix of Investor-State disputes displays a negative coefficient but it only is significant when controls are added. This last equation is the one that is the closest to (Linsenmeier et al., 2023). Yet, in contrast to their work, the regression is augmented by the spatial matrix recording ISDS attacks. In the last column, the interaction terms between the presence of Philip Morris and the weighted effect of litigations is added to the regression as done in table 3.3. The coefficient of the interaction terms is also negative but this is not significant. When the main effect and the interacted effect are added together, the hindering effect of an Investor-State dispute on a given regulation slightly exceeds the emulating effect of previous adoption.

Table 3.7: Quantification

	(1)	(2)	(3)	(4)	(5)
	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$	$\mathbb{1}_{\text{adoption}_{opmy}}$
$\log\left(W^{\text{dom}}_{o(m-6)}\right)$	0.00187**	0.00207**	0.500***	0.612**	0.643*
	(1.98)	(2.03)	(3.54)	(2.21)	(1.89)
$\log\left(W^{\text{isds}}_{o(m-6)}\right)$	-0.00129*	-0.00120	-0.0722	-0.339**	-0.316**
	(-1.77)	(-1.51)	(-0.91)	(-2.46)	(-2.49)
$\mathbb{1}[\text{PM presence}_{oy} \times \text{BIT} == 1] \times \log\left(W^{\text{isds}}_{c(m-6)}\right)$					-0.485
					(-1.40)
Time-FE	Yes	Yes	Yes	Yes	Yes
Country X Policy-FE	Yes	Yes	Yes	Yes	Yes
Cluster	Yes	Yes	Yes	Yes	Yes
Control	No	Yes	No	Yes	Yes
Model	Log	Log	Cox prop. hazard	Cox prop. hazard	Cox prop. hazard
R2	0.52	0.53			
Observations	29,964	23,015	29,826	22,877	22,877

Note : The first two columns of the table estimate the linear probability model shown by equation 3.3 with all regressors in log. Column (3) to (5) estimate a semi-parametric Cox proportional hazard model. All regressions include the set of controls for the adopting country with a one-year lag (o): log of GDP, log of GDP per capita, og of government expenditure and the log of Polity IV, a measure of democracy. The t statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It is then possible to look at a dyad and compute how much previous litigation in a country distorts the hazard of policy adoption in the other country. The estimated coefficients on the spatial matrix of adoption (column (4) in table 3.7) and of litigation are multiplied to the average weight within a dyad.[14] The exponential of the result gives the percentage change of the hazard of adoption following the adoption of one country of the dyad and following a dispute, respectively. An interpretation of the above table is, for instance, that New Zealand experiences a 7% increase in its hazard of adopting the plain packaging regulation following the adoption by Australia (1%-14% at the 95% confidence interval). However, Philip Morris' litigation against this policy decreases this hazard rate by 4% (-1%-6.5% at the 95 CI). While these effects are not huge they still suggest that countries do react to Investor-State disputes. Investment protection is therefore likely to be used in a strategic way by multinational firms and ultimately to shape the global regulatory environment.

[14] Alternatively, the quantification exercise could be done solely on countries facing the risk of an attack by the attacking MNE (column (5)) with a bigger effect. Yet, because the interaction term is noisily estimated, it is more accurate to quantify the effect of litigations based on the baseline regression as displayed in column (4).

3.5. Conclusion

This paper explores the role of Investor-State disputes on the international diffusion of regulations. Given the important network of investment investment treaties, Investor-State disputes create global precedents. In this context, firms operating in several jurisdictions that need to comply with a given regulation may have incentives to contest the first adoption of a regulation to deter other countries from adopting it. Empirically, the example of the tobacco control policy shows both sharp patterns of policy diffusion and hindrance from litigation: adoptions of regulations do emulate adoptions in other jurisdictions but when these regulations are challenged by multinational firms, it creates a deterrence effect. Overall, this paper describes a globalization of both policy making and legal norms. While the globalization of policy making is fueled by international cooperation and multilateralism, it is also shaped by the effect of multinational firms, which are, by nature, transnational subjects of rights and obligations. Understanding the role of investment protection is key for the future of international policy making. The methodology developed in this paper should for instance help understanding the forces at stake around the very active efforts of international tax coordination or on climate-related issues.

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3.6. Appendices

3.7. Appendix

3.7.1. Model - additional equations and proofs

3.7.1.1. Pay-off comparisons

In this subsection, we derive the pay-off comparison for the four possible pairs of probabilities drawn by the MNE and look at the two-period expected pay-off with and without litigation against S_1. Before turning to that exercise, it is useful to express Ω_1 and Ω_0.

$$\begin{aligned}\Omega_1 &= \frac{\mathbb{P}\left(S_1 \text{ sued}|C\right) \times \mathbb{P}\left(C\right)}{\mathbb{P}\left(S_1 \text{ sued}\right)} \\ &= \frac{\mathbb{P}\left(S_1 \text{ sued } |(p_{1,H}, p_{2,H})\right) \times \mathbb{P}\left((p_{1,H}, p_{2,H})\right) + \mathbb{P}\left(S_1 \text{ sued } |(p_{1,L}, p_{2,H})\right) \times \mathbb{P}\left((p_{1,L}, p_{2,H})\right)}{\mathbb{P}\left(S_1 \text{ sued}\right)} \\ &= \frac{\epsilon_1 m_{H,H} + \gamma_2 m_{L,H}}{\epsilon_1 m_{H,H} + \gamma_2 m_{L,H} + \gamma_1 m_{H,L} + \epsilon_2 m_{L,L}}\end{aligned}$$

By the same token, Ω_0 can be written as:

$$\Omega_0 = \frac{\epsilon_1(1 - m_{H,H}) + \gamma_2(1 - m_{L,H})}{\epsilon_1(1 - m_{H,H}) + \gamma_2(1 - m_{L,H}) + \gamma_1(1 - m_{H,L}) + \epsilon_2(1 - m_{L,L})}$$

We then compare the expected pay-off for the four different combination of types.

H,H. In case of high probability of winning in both States. The expected pay-off in case of litigation $\mathbb{E}^{isds}_{HH}\left[Y_{HH}; \pi_i(r) = 1\right]$ writes:

$$\mathbb{E}^{isds}_{HH}\left[Y_{HH}; \pi_i(r) = 1\right] = 0 + 0 \times \mathbb{1}\left\{\Omega_1 \leq \frac{v}{p_{2,H} + d}\right\}$$

The expected pay-off in absence of litigation $\mathbb{E}^{noisds}_{HH}\left[Y_{HH}; \pi_i(r) = 1\right]$ writes:

$$\mathbb{E}^{noisds}_{HH}\left[Y_{HH}; \pi_i(r) = 1\right] = -R + 0 \times \mathbb{1}\left\{\Omega_0 \leq \frac{v}{p_{2,H} + d}\right\}$$

It follows immediately that the firms would always litigate in the first period. ($m^*_{HH} = 1$)

L,H. The expected pay-off in case of litigation $\mathbb{E}_{LH}^{isds}[Y_{HH}; \pi_i(r) = 1]$ writes:

$$\mathbb{E}_{LH}^{isds}[Y_{LH}; \pi_i(r) = 1] = -R - c + 0 \times \mathbb{1}\Big\{\Omega_1 \leq \frac{v}{p_{2,H} + d}\Big\}$$

The expected pay-off in case of absence of litigation $\mathbb{E}_{LH}^{isds}[Y_{HH}; \pi_i(r) = 1]$ writes:

$$\mathbb{E}_{LH}^{noisds}[Y_{LH}; \pi_i(r) = 1] = -R + 0 \times \mathbb{1}\Big\{\Omega_0 \leq \frac{v}{p_{2,H} + d}\Big\}$$

It follows immediately that the firms would never litigate in the first period ($m_{LH}^* = 0$).

H,L & L,L. For the two cases where the firm has low type in period 2, the comparison of expected pay-off is less trivial given the non-null pay-off in period 2. In these case, the posterior beliefs of S_2 (Ω_1 in case of litigation and Ω_0 in absence of litigation). Because both m_{HL}^* and m_{LL}^* determine State 2's belief, they need to be determined simultaneously.
Let's first suppose that $m_{LL}^* = 0$. In such case, given the optimal strategies $\{m_{LL}^* = 0, m_{HH}^* = 1, m_{LH}^* = 0\}$ attacking S_1 with types HL ($m_{HL}^* = 1$) would yields Ω_1 as:

$$\Omega_1(m_{HL}^* = 1; m_{LL}^* = 0) = \frac{\epsilon_1}{\epsilon_1 + \gamma_1}$$

On the contrary, refraining from attacking ($m_{HL}^* = 0$) would yield the following Ω_0:

$$\Omega_0(m_{HL}^* = 0; m_{LL}^* = 0) = \frac{\gamma_2}{\gamma_2 + \epsilon_2 + \gamma_1}$$

The firm therefore compares the following pay-offs; When attacking, in expectation, the firms gets:

$$\mathbb{E}_{HL}^{isds}[Y_{HL}; \pi_i(r) = 1] = 0 - R \times \mathbb{1}\Big\{\frac{\epsilon_1}{\epsilon_1 + \gamma_1} \leq \frac{V}{p_{2,H} + d}\Big\}$$

Without attacking,

$$\mathbb{E}_{HL}^{noisds}[Y_{HL}; \pi_i(r) = 1] = -R - R \times \mathbb{1}\Big\{\frac{\gamma_2}{\gamma_2 + \epsilon_2 + \gamma_1} \leq \frac{V}{p_{2,H} + d}\Big\}$$

It shall be evident that the firm is either indifferent between attacking or not (when $\frac{\epsilon_1}{\epsilon_1 + \gamma_1} \leq \frac{V}{pH + d} \leq \frac{\gamma_2}{\gamma_2 + \epsilon_2 + \gamma_1}$) or strictly better-off attacking in all other cases.

Therefore, fixing $m_{L,L} = 0$ yields an optimal strategy $m_{H,L} = 1$. Let's now suppose that $m^*_{L,L} = 1$. Comapring the two:

$$\Omega_1(m^*_{HL} = 1; m^*_{LL} = 1) = \frac{\epsilon_1}{\epsilon_1 + \gamma_1 + \epsilon_2}$$

On the contrary, refraining from attacking ($m^*_{HL} = 0$) would yield the following Ω_0:

$$\Omega_0(m^*_{HL} = 0; m^*_{LL} = 1) = \frac{\gamma_2}{\gamma_2 + \gamma_1}$$

$$\mathbb{E}^{isds}_{HL}\left[Y_{HL}; \pi_i(r) = 1\right] = 0 - R \times \mathbb{1}\Big\{\frac{\epsilon_1}{\epsilon_1 + \gamma_1 + \epsilon_2} \leq \frac{V}{p_{2,H} + d}\Big\}$$

$$\mathbb{E}^{noisds}_{HL}\left[Y_{HL}; \pi_i(r) = 1\right] = -R - R \times \mathbb{1}\Big\{\frac{\gamma_2}{\gamma_2 + \gamma_1} \leq \frac{V}{p_{2,H} + d}\Big\}$$

The same reasoning as above applies and the firm should either be indifferent or better-off attacking. As a result, regardless of the strategy adopted by the firm with low types against both States, $m^*_{HL} = 1$. The last step is to determine the optimal strategy of the firm given the three optimal strategies: $\{m^*_{HL} = 1, m^*_{HH} = 1, m^*_{LH} = 0\}$. As for the previous cases, the firm compares the 2-period expected pay-off with and without litigation against S_1.

$$\mathbb{E}^{isds}_{LL}\left[Y_{LL}; \pi_i(r) = 1\right] = -c - R - R \times \mathbb{1}\Big\{\frac{\epsilon_1}{\epsilon_1 + \gamma_1 + \epsilon_2} \leq \frac{V}{p_{2,H} + d}\Big\}$$

$$\mathbb{E}^{noisds}_{LL}\left[Y_{LL}; \pi_i(r) = 1\right] = -R - R \times \mathbb{1}\Big\{\frac{\gamma_2}{\gamma_1 + \epsilon_2} \leq \frac{V}{p_{2,H} + d}\Big\}$$

Given that $c < R$, the firm is willing to litigate if $\frac{\gamma_2}{\gamma_2 + \epsilon_2} \leq \frac{V}{p_{2,H}R + d} \leq \frac{\epsilon_1}{1 - \gamma_2}$, as expressed in section 3.2.

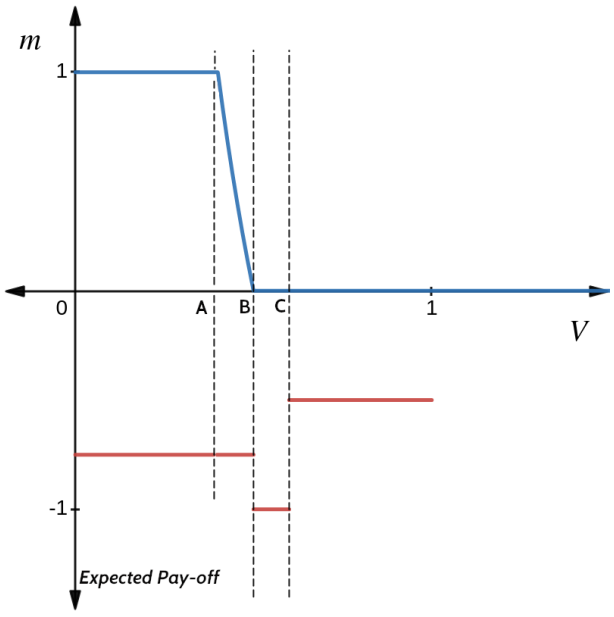
3.7.1.2. Mixed strategies

In mixed strategy, the $m_{L,L}$ can take value between 0 and 1. The firm mixes to make State 2 indifferent between regulating or not. Above that threshold, the cost of litigating S_1 with low merits is too high compared to the deterrence effect and below that threshold, the signal is not strong enough to deter S_2 from regulation. The decision rule in case of litigation writes:

$$m^*_{L,L} = \begin{cases} 1, & \text{if } \dfrac{V}{Rp_{2,H}+d} \leq \left(\dfrac{\epsilon_1}{1-\gamma_2}\right) \\ \dfrac{\epsilon_1}{\epsilon_2}\left(\dfrac{Rp_{2,H}+d-V}{V}\right) - \dfrac{\gamma_1}{\epsilon_2}, & \text{if } \left(\dfrac{\epsilon_1}{\epsilon_1+\gamma_1}\right) > \dfrac{V}{Rp_{2,H}+d} > \left(\dfrac{\epsilon_1}{1-\gamma_2}\right) \end{cases} \tag{3.4}$$

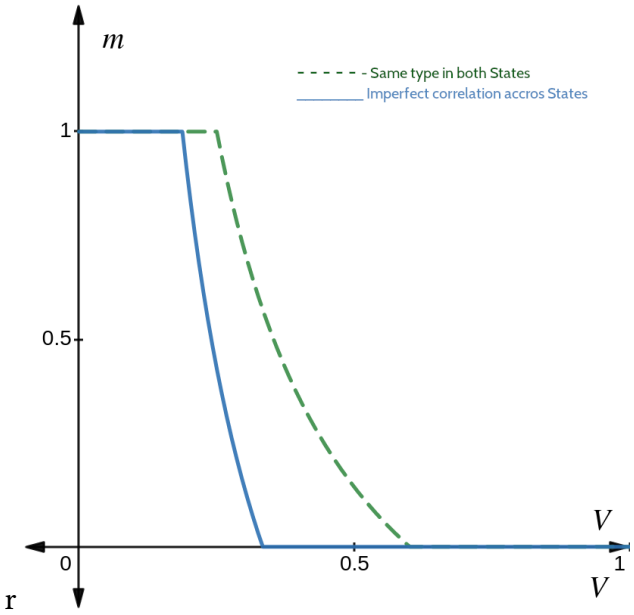
In absence of litigation, the firm would get the same pay-off as in the pure strategy case. Graph 3.10 summarizes the optimal strategies depending on the value of V as well as the corresponding pay-off in mixed strategy and graph 3.11 show the sensibility of the mixed strategies to imperfect correlation accross type.

Fig. 3.10. Optimal mixed strategies and corresponding pay-offs



Note : The following graph is shown for parameters: $\epsilon_1 = 0.5, \gamma_1 = 0.1, \gamma_2 = 0.25, \epsilon_2 = 0.15$. $R = 0.5, c = 0.25, (Rp + d) = 0.6$
A=$\dfrac{\epsilon_1}{1-\gamma_2}$, B=$\dfrac{\epsilon_1}{\epsilon_1+\gamma_1}$ & C=$\dfrac{\gamma_2}{\gamma_2+\epsilon_2}$

Fig. 3.11. Type correlation and optimal strategies



Note : The "Imperfect correlation" scenario takes the following parameters: $\epsilon_1 = 0.25, \epsilon_2 = 0.45, \gamma_1 = 0.15$. γ_1 is set to 0 for when both types are the same across countries.

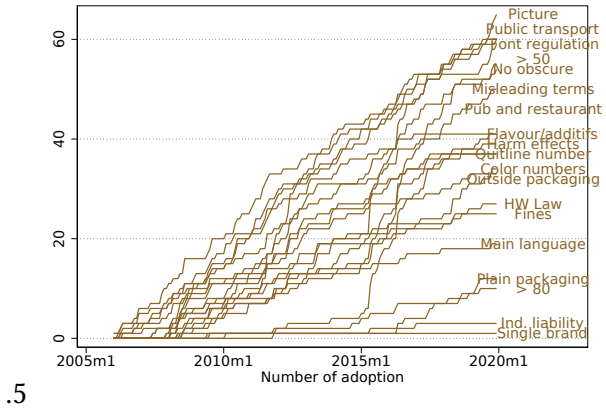
3.7.2. A - Data and stylized facts

Table 3.8: Description of policies

Policy name	Description
Misleading terms	Ban on deceitful terms on cigarette packaging
$\geq$ 50 %	% of principal display area mandated to be covered by health warnings $\geq$ 50%
$\geq$ 80 %	% of principal display area mandated to be covered by health warnings $\geq$ 80%
Single Brand	Each cigarette brand limited to just a single variant or brand type
Plain packaging	Packaging other than brand and product names displayed in a standard color. No font style.
Flavour	Packaging and labelling must not use descriptors depicting flavours
Colour Numbers	Packaging and labelling must not use figurative, colors or numbers for prohibited misleading terms
Font	Font style, font size and colour of health warnings mandated
Outside pack	Warnings appear on any outside packaging/labelling used in the retail sale
Harm effects	Warnings on packaging describe the harmful effects of tobacco use on health
Industry liability	Warnings on packaging do not remove or diminish the liability of the tobacco industry
Import duty-free	Law applys to products whether manufactured domestically, imported and for duty-free sale
Fines	Warnings on packaging law requires or establishes fines for violations
Top side	Warnings on packaging must be placed at the top of the principal display areas
Main language	Warnings must be written in the main language(s) of the country
Graphic	Warnings on packaging must include a photograph or graphic
No obscure	Warnings on packaging must not be obscured
Health Warnings	Law mandates that health warnings appear on cigarette packages
Quit line	The quit line number must appear on cigarette packaging or labelling
Restaurants	Smoking prohibited in pubs and restaurants
Transport	Smoking ban in public transport
Emissions	Packaging and labelling must not display quantitative info. on emission yields

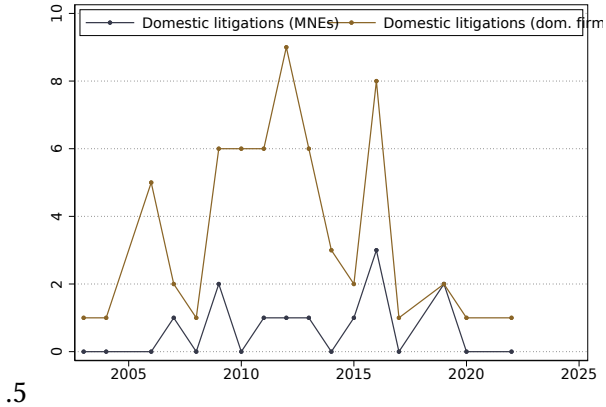
Source: Global Health Observatory (GHO), World Health Organisation

Fig. 3.12. Policy adoptions and litigation in the tobacco industry



.5

Fig. 3.13. Policy adoptions



.5

Fig. 3.14. Litigations

3.7.3. B - Costs of ISDS

Table 3.9: Splits of costs in ISDS cases

	Obs	Mean (in %)	sd	| C wins	| R wins
C share of R legal costs	219	15.49	32.24	0.07	27.53
C share of its own legal costs	219	86.74	28.18	70.81	98.88
R share of its own legal costs	219	84.90	31.91	99.93	73.16
R share of C legal costs	219	13.33	28.17	29.19	1.24
C share of tribunal costs	222	52.87	27.93	34.09	67.00
R share of tribunal costs	222	47.13	27.93	65.91	33.00

Note: This table presents the final share of legal cost paid by claimant (MNEs) and respondents (States) for 219 Investor-State Dispute. The data is taken from Hodgson (2017) and complemented with own research and calculations based on the IA Reporter website. "C" indicates "Claimants" and R indicates "Respondent". In the last two columns, the sample is split based on the outcome. "| C wins" indicates "conditional on the claimant winning the case" and "| R wins" indicates "conditional on the respondent winning the case". Yukos vs. Russia (2016) excluded as it appears to be a clear outlier with a USD 5 bn sanction.

Institut d'études politiques de Paris
ÉCOLE DOCTORALE DE SCIENCES PO
Programme doctoral en économie
Département d'économie
Doctorat en sciences économiques

La mondialisation sans le cosmopolitisme: trois essais d'économie internationale

Samuel Delpeuch
Thèse dirigée par Thierry Mayer, Professor of Economics, Sciences Po

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Jury

Thierry Mayer, Professeur des Universités, Sciences Po

Isabelle Méjean, Professeur FNSP, Sciences Po

Mathieu Parenti, Professeur titulaire, PSE *(rapporteur)*

Vincent Vicard, Adjoint au directeur et Responsable du programme 'Analyse du commerce international', CEPII

Banu Demir, Associate Professor, University of Oxford *(rapportrice)*

Résumé en Français

La mondialisation sans le cosmopolitisme

Largement absent de la littérature économique, le cosmopolitisme est un vieux concept philosophique trouvant ses origines dans la philosophie stoïcienne et selon lequel la simple nature humaine conférerait un droit de cité à chacun, au-delà des origines géographiques. À la fin du XVIIIe siècle, Emmanuel Kant fut le premier à jeter les bases d'une philosophie politique du cosmopolitisme. Alors que cette vision, étroitement associée à celle d'une "paix perpétuelle", (Kant, 1795) est principalement passée à la postérité comme une utopie, Kant décrit l'avènement d'un État mondial comme un processus inévitable, paradoxalement alimenté par le chaos insoutenable des guerres et des troubles mondiaux en tant qu'il constitue son dépassement. La vision kantienne du cosmopolitisme était en effet intrinsèquement liée à sa philosophie de l'histoire et plus généralement à sa philosophie de la connaissance. Pour parvenir à cette conclusion, Kant s'appuie sur une vision téléologique de l'Histoire, selon laquelle les actions individuelles chaotiques et illisibles prennent un sens lorsqu'elles sont agrégées dans l'espace et dans le temps, orientées vers un sens historique. Dans cette perspective, la raison humaine, plus petit dénominateur commun de l'humanité, contribue à sublimer les troubles mondiaux à travers une société bien organisée. Derrière cette intuition d'insociable sociabilité, (Kant, 1784), Kant dépeint un mécanisme optimiste où les conflits et les tensions entre Nations portent en eux leur résolution.[1] Cette introduction vise à montrer que l'influence de cette pensée continue d'irriguer les sciences sociales portées sur l'analyse de la mondialisation et l'économie internationale en particulier. Le contexte philosophique est essentiel pour comprendre les racines épistémologiques de l'analyse moderne et contemporaine de la mondialisation. En science politique, la vision libérale de la mondialisation est longtemps restée profondément ancrée dans ce conséquentialisme : qu'elles aillent dans dans le sens de l'Histoire ou non, la mondialisation et ses soubresauts sont considérés comme portant en eux les germes de la paix (Montesquieu, 1758), conduisant inévitablement à la "fin de l'histoire" (Fukuyama, 1992) et l'intégration mondiale. En économie, une traduction frappante de ce dépassement mécanique d'intérêts divergents vers une

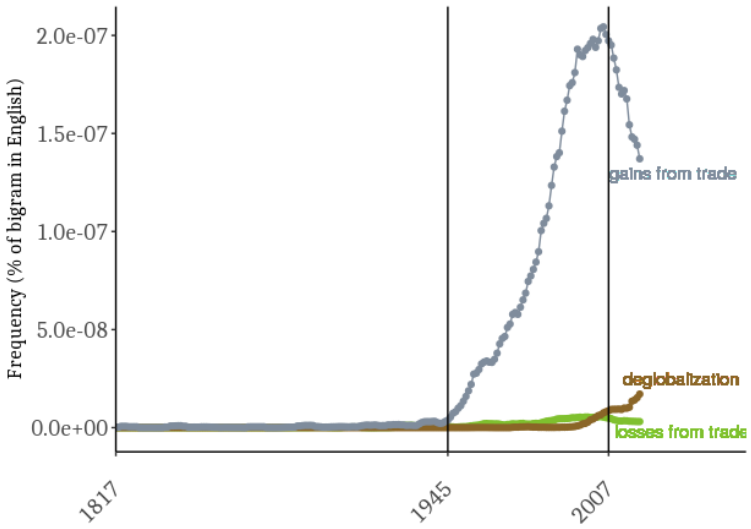
[1] A cet égard, Kant transpose à l'échelle mondiale l'idée de Smith de la main invisible de marché (où les égoïsmes convergent vers une équilibre bénéfiques à tous) bien qu'il reconnaisse que la nature humaine est, en pratique, beaucoup plus sujette aux conflits ((Kant, 1784), 4ème proposition).

coopération mutuellement bénéfique peut être trouvée dans la notion ricardienne d'avantages comparatifs (Ricardo, 1817), qui reste encore aujourd'hui une pierre angulaire de l'analyse du commerce international et de l'économie internationale. Trois siècles après Kant, non seulement le cosmopolitisme demeure hors de portée, mais le simple processus de mondialisation est sous le feu des critiques. On observe aujourd'hui un mécontentement croissant à l'égard de la mondialisation et à l'encontre des institutions multilatérales – parfois présentées comme des jalons vers le cosmopolitisme. Laissant la description de certains aspects de ce contre-coup aux trois chapitres de cette thèse, cette introduction (i) se demandera dans quelle mesure, par opposition à la vision libérale de la mondialisation, la mondialisation pourrait être considérée comme un processus auto-destructeur (ii) à comprendre les implications méthodologiques et épistémologiques quant au portrait que l'économie international dresse de la mondialisation (iii) situera les trois chapitres de cette thèse dans cette réflexion.

Le vœux pieux des économistes sur la mondialisation

La littérature de commerce international et macroéconomique sur la mondialisation a été largement dominée par l'examen minutieux des gains commerciaux au détriment de l'analyse des problèmes découlant de la mondialisation. La figure 3.15 reflète l'apparition en langue anglaise de l'expression "gains issus du commerce" dans l'échantillon de Google Books Ngram depuis sa première occurrence enregistrée en 1815, deux ans avant les Principes d'économie politique et de fiscalité de Ricardo et la compare aux occurrences en langue anglaise de "pertes dues au commerce" ou à la "démondialisation".

Fig. 3.15. Occurences de "gains from trade" comparé à "losses from trade"



L'asymétrie observée entre l'accent mis sur les gains et les pertes du commerce pourrait refléter un biais heuristique par lequel l'effet mutuellement bénéfique du commerce est étudié parce qu'il est espéré. Pourtant, après la crise financière de 2008, la littérature générale semble moins prolifique sur les "gains du commerce". Dans la préface de son livre de 2010 sur le paradoxe de la mondialisation, Dani Rodrik note que les économistes et les conseillers politiques font preuve depuis trop longtemps de myopie à l'égard des tensions et des fragilités qu'engendre la mondialisation économique (…). Le problème n'est pas que les économistes soient les grands prêtres du fondamentalisme du libre marché, mais qu'ils souffrent des mêmes biais heuristiques que les gens ordinaires. Ils ont tendance à faire preuve d'une pensée de groupe et d'un excès de confiance, en s'appuyant excessivement sur les éléments de preuve qui soutiennent leur récit préféré du moment, tout en rejetant d'autres qui ne correspondent pas aussi bien (Rodrick, 2011). La pensée de groupe soulignée par Rodrick pourrait bien trouver ses racines épistémologiques et philosophiques dans l'idéalisme téléologique kantien et dans la notion séduisante d'insociable sociabilité , concept selon lequel les troubles mondiaux ne sont rien d'autre qu'un carburant pour une intégration internationale plus profonde. Loin de cette vision optimiste, des preuves récentes suggèrent au contraire que la coopération internationale et les activités transnationales pourraient se retourner contre la mondialisation elle-même (**?**). Ce cercle vicieux pourrait à l'inverse être décrite comme une forme de sociabilisation (internationale) anti-sociale.

Quand la mondialisation se tire une balle dans le pied

Plus de deux décennies après l'entrée de la Chine à l'Organisation mondiale du commerce (OMC), le consensus scientifique concernant les effets économiques du choc chinois a considérablement changé (Autor et al., 2016). Les gains commerciaux associés au libre-échange promis par les modèles économiques du début des années 2000 semblent largement contre-balancés par des effets secondaires, notamment sur les marchés du travail, sur les dépendances ou normes stratégiques et sur l'affaiblissement des normes environnementales et sociales. Au-delà du simple cas chinois, la notion de retour de bâton de la mondialisation prend forme dans la littérature économique suite à la montée des partis nationalistes dans les pays développés. En explorant des sondages d'opinion sur la mondialisation et des données électorales, (Colantone et al., 2022) décrivent la mutation politique à l'encontre les partis pro-mondialisation et la montée des interventions protectionnistes. Ils montrent ensuite les canaux théoriques de ces "pertes dûs au commerce", c'est-à-dire les manières par lesquelles l'ouverture commerciale peut être préjudiciable pour certains segments de la population. Dès lors que l'analyse de bien-être prend en compte l'aversion contre les inégalités ou la perte de souveraineté et de prérogatives stratégiques, les implications de l'ouverture au commerce se trouvent transfigurées. Compte tenu de ces aspects, "l'empreinte so-

ciale" du processus de mondialisation pourrait jouer contre l'utopie ultime et la pleine réalisation du cosmopolitisme. Un parallèle peut ici être dressé avec l'intégration européenne et la méthode dite des petits pas selon laquelle le rapprochement économique devait *de facto* pousser les pays membres à se rapprocher politiquement pour accompagner ce changement. Le fait que cette méthode des petits pas ait largement été critiquée et que l'Union Européenne cherche à combler ce déficit démocratique par des politiques de planifications et de grand objectifs auxquels seraient subordonnées des politiques économiques montrent que la poltique ne peut durablement s'adapter aux mutations économiques. Dans le cadre européen, cela est rendu possible par l'existence d'institution politiques capables d'incarner ce geste politique mais ces institutions n'existent pas au niveau global. Par conséquent et faute d'incarnation politique crédible, même agrégées au niveau des États, une intégration commerciale globale et une mondialisation accrue pourraient s'avérer contre-productives. Le premier chapitre de cette thèse montre comment une intégration commerciale plus poussée et des déséquilibres commerciaux plus larges peuvent se retourner contre le commerce lui-même en alimentant des politiques protectionnistes visant à sauver des emplois nationaux. De plus, le commerce international peut déstabiliser le *status quo* géopolitique. Contestant la vision libérale selon laquelle le "doux commerce" (international) prévient les conflits en augmentant les interdépendances et donc le coût de la guerre, (Martin et al., 2008) montrent que le commerce mondial accroît effectivement les interdépendances mondiales (et réduit donc le risque de guerres mondiales) mais alimente en retour les conflits locaux. La liste des coûts cachés de la mondialisation est longue, mais les conséquences mondiales et les externalités environnementales associées au commerce pourraient être les plus préoccupantes.

Une mondialisation sans cosmopolitisme

L'absence d'institutions mondiales capables d'atténuer les effets néfastes de la mondialisation est une caractéristique essentielle de l'économie mondiale qui doit être analysée en conséquence. Ce vide juridique et politique représente une différence fondamentale entre l'économie internationale et les économies fermées. En règle générale, toute analyse du bien-être par planification centralisée appliquée à l'échelle mondiale nourrit une vision inappropriée de l'ordre mondial. La conséquence entre la description du commerce international comme un jeu à somme positive et l'énonciation d'une amélioriaton de bien-être liée à ce phénomène repose sur l'hypothèse sous-jacente selon laquelle la redistribution est possible et peu coûteuse. Ces critères dits de Kaldor-Hicks caractérisant l'efficacité du commerce équivalent à poser l'existence d'un contrat social mondial dans lequel les agents (i) s'accordent sur la théorie de la justice (ii) construisent des institutions efficaces atteignant les objectifs de bien-être implicites. (Antràs et al., 2017) propose deux ajustements en ajoutant des agents de redistribution coûteuse et défavorables aux

inégalités et montre que les gains ultimes du commerce sont substantiellement affectés par ces deux ajustements. Pourtant, les outils standards de l'économie du bien-être ne peuvent pas être entièrement copié-collés de l'analyse du cadre national vers le contexte international pour plusieurs raisons. Au niveau individuel, la spécificité du commerce international réside probablement moins dans la montée des inégalités que dans l'existence d'injustices et d'inéquité, comme le suggère Rodrik. Suivant l'intuition rawlsienne d'un contrat social qui pourrait inclure un écart par rapport à l'égalité pure tant que ces inégalités (a) profitent au bas de la distribution et (b) reposent sur une juste égalité des chances, les critères de justice à l'aune desquels doit être évaluée la mondialisation incluent l'égalité des chances initiales des différentes parties prenantes. Ces critères de bien-être non utilitaristes sont clairement violés par le processus de mondialisation qui met en concurrence des États-nations caractérisés par des normes, des règles et des contextes socio-économiques hétérogènes. Deuxièmement, il existe un vide institutionnel qui empêche les critères traditionnels de protection sociale d'être pleinement pertinents dans le contexte mondial. Compte tenu de la multiplicité des niveaux et de la diversité des parties prenantes à l'échelle mondiale, les critères de bien-être national et les institutions correspondantes ne parviennent pas à surmonter les chocs induits par le commerce. En somme, la définition très superficielle du bien-être – généralement défini uniquement comme le revenu réel – combinée à l'absence de contrats sociaux mondiaux appelle à un cadre analytique *ad hoc* de l'économie publique internationale et à davantage de recherches dans cette direction.

L'exogénéité de la mondialisation ? Causes toujours !

Au-delà de l'absence de cosmopolitisme contractuel, on pourrait affirmer que les normes mondiales apparaissent et se diffusent *de facto* au gré de l'ouverture des frontières à une multitudes d'acteurs: le commerce au-delà des frontières, une ONG faisant campagne dans diverses juridictions, une entreprise multinationale mettant en œuvre des habitudes de gestion dans plusieurs pays, une organisation internationale mettant en place des conventions multilatérales… Une approche empirique de la mondialisation déplace l'orientation des recherches d'une approche normative vers une approche positiviste de la mondialisation et vise à comprendre comment le global transforme le local et *vice versa*. Comme pour la grande majorité des domaines économiques, l'économie internationale a largement pris un tournant empirique. Mais là encore, la spécificité du contexte global rend difficile la simple réplication des outils empiriques standards utilisés dans d'autres domaines, et notamment des stratégies d'inférence causale. Le premier problème qui se pose est la multiplicité et l'imbrication des niveaux d'analyse et de prise de décision au sein de l'économie mondiale. On peut globalement distinguer trois niveaux : le niveau intra-national, le niveau international et le niveau transnational :

- Au niveau intra-national, les agents – généralement des entreprises ou des individus – sont souvent perçus comme des acteurs atomistiques prenant l'ouverture de leur économie comme donnée. Pourtant, il convient de reconnaître aux récents développement de la littérature économique d'avoir soigneusement pris en compte le niveau élevé d'hétérogénéité des individus et des entreprises, ce qui entraîne un effet et des conséquences asymétriques de la mondialisation au sein d'une économie (Melitz, 2003). À cet égard, l'amélioration de l'accès aux micro-données constitue un moteur important pour le progrès scientifique. Au-delà de la simple observation d'une hétérogénéité importante entre les individus et les entreprises, une littérature encore plus récente s'intéresse aux agents les plus riches et possédant par conséquent la plus grande influence sur l'économie et ses institutions. Du côté des entreprises, les fluctuations macroéconomiques sont fortement influencées par un nombre limité de grandes sociétés multinationales (Gabaix, 2011). Concernant la taille des individus, la concentration sur la richesse parmi les déciles les plus aisés de la distribution des revenus suggère qu'une plus grande attention devrait être accordée à la compréhension du comportement de ces individus très riches (Piketty, 2013). Cette importante concentration de richesse et de création de valeur au sein d'un nombre relativement limité d'agents affaiblit à son tour le paradigme fondé sur l'atomicité et ouvre la porte à un pan de recherche connexe qui vise à comprendre l'influence des "happy few" (les plus grandes entreprises et les plus productives) sur leur environnement et sur la mondialisation en particulier. Alors que la thématique du pouvoir de marché revient en force dans la littérature économique internationale, notamment celle sur l'évolution du partage de la valeur dans l'économie mondiale, la notion de pouvoir politique et normatif est légèrement moins étudié en dépit de son rôle crucial dans la manière avec laquelle le paysage mondial est façonné. De ce point de vue, certaine contributions récentes vont dans le bon sens et s'intéressent aux liens entre pouvoir politique et pouvoir économique dans le contexte de la mondialisation. En raison de leurs moyens et de leur intérêt accrus pour influencer leur environnement réglementaire, les plus grandes sociétés multinationales et les propriétaires de capitaux les plus riches exercent de plus en plus d'influence, par le biais du lobbying et de la diffusion de normes (voir.(Blanga-Gubbay et al., 2020)). Cet aspect de la mondialisation complexifie à son tour la relation causale entre l'ouverture des économies et les comportements individuels puisque le lien de causalité fonctionne dans les deux sens.
- Au niveau international, les États sont des unités d'observation importantes avec leur propre logique, raison d'être et horizon temporel. À ce niveau, les études statistiques et les approches d'inférence causale de la mondialisation se heurtent à la question de la transmission de la causalité de la couche inférieure à la couche supérieure. Premièrement, les États sont eux-mêmes composés d'institutions locales et régionales souvent ignorées dans

la littérature économique internationale. En outre, même si la nature atomistique des entreprises individuelles ou des individus formant une économie donnée peut être acceptable dans certaines circonstances, les États sont des acteurs hautement réflexifs et stratégiques. Les juridictions étatiques et non-étatiques constituent un échantillon d'un peu plus de 200 observations et les chocs susceptibles d'affecter les relations entre États sont généralement des événements importants et rares pour lesquels la validité externe reste très limitée. L'établissement d'un lien causal à l'échelle nationale semble très compliquée à établir. Si l'accès à l'observation au niveau micro et au réductionnisme scientifique permet plus largement de comprendre des relations organiques importantes et de cerner les élasticités, il ne parvient pas à saisir la nature holistique des États, qui englobe bien plus que la somme de leurs composantes. Au-delà de la question épistémologique de l'existence d'une causalité à un niveau supérieur, la littérature empirique au niveau national est également entravée par la qualité des données. Au niveau national, les données – et plus important encore les comptes nationaux – doivent elles-mêmes être considérées comme le résultat du contexte institutionnel. (Lane and Milesi-Ferretti, 2007) et (Zucman, 2013) ont été parmi les premiers à montrer que l'évasion fiscale entre États générait des incohérences systématiques sur les balances des paiements. Là encore, le cadre et les outils pertinent d'analyse de la mondialisation semblent consubstantiels au processus de mondialisation lui-même. Pourtant, les limites associées aux comparaisons entre pays en matière d'inférence causale ne devraient pas empêcher les chercheurs d'étudier le comportement des États et d'étudier la mondialisation à travers ce prisme, compte tenu du rôle que ces acteurs continuent de jouer dans le façonnement de l'économie mondiale et des institutions mondiales.

- La mondialisation est également façonnée par des acteurs transnationaux opérant au-delà des frontières nationales. Négativement définit comme l'ensemble des institutions et des relations qui ne peuvent être réduites aux niveaux intra-national ou inter-national, l'échelon trans-national recouvre de nombreuses institutions: réseaux sociaux, communautés religieuses, institutions supra-nationales comme l'Union européenne, organisations internationales, ONGs, entreprises multinationales… Alors que les institutions internationales internationales (ONU, la Banque Mondiale…) ou les ONGs sont clairement guidées par des motivations politiques et des opinions explicites sur les principes de la justice mondiale, d'autres réseaux transnationaux contribuent à la diffusion de normes et de valeurs plus indirectement. C'est ce que suggère le troisième chapitre de cette thèse avec l'exemple du règlement des différends entre investisseurs et États et du droit de l'investissement. Empiriquement, la nature transnationale des institutions soulève également des défis en raison de leur complexité. Au niveau des entreprises, la libre circulation des capitaux et l'optimisation fiscale sont associées à une mauvaise mesure systématique de la contribution

des entreprises au revenu national, comme le montre le deuxième chapitre de cette thèse. Là encore, la question de la mesurabilité et de l'observabilité des acteurs transnationaux est clef pour l'avenir de la recherche empirique autour de la mondialisation. L'initiative Sig-Watch est un exemple de collecte de données sur l'activité des ONG dans le monde entier visant à combler cette lacune ((Hatte and Koenig, 2020)). La documentation de l'activité des entreprises multinationales s'améliore également. Dans certaines industries où la production est suffisamment standardisée comme l'industrie automobile, des informations peuvent être recueillies sur les choix de transport et de production. Pourtant, l'accès aux informations sur les bilans et aux liens de propriété pour les entreprises multinationales est encore perfectible. Ici encore, l'état de la mondialisation et l'absence d'autorité supérieure et globale transnationale l'opacité associée aux paradis fiscaux conduit à une détérioration systématique de la couverture des données dans les juridictions à faible fiscalité et l'absence d'administration mondiale explique l'absence de déclarations fiscales internationales qui seraient généralement robustes à cette caractéristique institutionnelle. Les efforts déployés depuis longtemps par des organisations (elles-mêmes transnationales !) comme le Tax Justice Network pour mettre en œuvre la déclaration pays-par-pays pour les entreprises multinationales se sont finalement concrétisés dans les lignes directrices anti-érosion de la base d'imposition et transfert de bénéfices mises en place par l'Organisation de coordination et de développement économiques (OCDE). Cela a rendu possible une meilleure évaluation économique de la production multinationale et, finalement, des régimes fiscaux alternatifs à l'échelle mondiale. Ce dernier exemple montre les interconnexions entre les acteurs transnationaux, la gouvernance mondiale et l'analyse de la mondialisation elle-même.

En résumé, l'influence croissante des travaux empiriques et de l'inférence causale pousse les économistes appliqués à rechercher des événements exogènes et souvent non-sociaux (chocs aléatoires, discontinuités naturelles, expériences contrôlées…) capables de s'affranchir de la complexité des relations historiques et construites pour mettre en évidence certains aspects des comportements des agents. Bien que ces méthodes présentent d'évidents avantages, elles semblent parfois peu adaptées à l'analyse d'une mondialisation caractérisée par divers niveaux et type d'acteurs qui ne peuvent pas tous être mis sur le même plan. De plus, la comparabilité et l'accès à des données de bonne qualité sont plus difficiles dans un contexte international comme suggéré plus haut. Enfin, il convient de noter que la vision naturaliste et déterministe du monde à laquelle conduit ce courant d'économie empirique est également à mettre en relation avec la philosophie classique – et kantienne – de la connaisssance dans laquelle l'existence ontologique d'un ordre existe et peut être déduit malgré le chaos apparent. Là encore, la complexité de la mondialisation constitue un sérieux défi à cette vision épistémologique et doit être prise comme telle pour éviter ce qu'Eric Monnet appelait "l'insoutenable légèreté des économistes".

Rester positif et positiviste

L'un des courants de littérature le plus aboutit en économie internationale est sans aucun doute l'équation de gravité, décrivant les déterminants du commerce international. Les allers-retours entre cadres théoriques et (in)validations empiriques ont largement contribués à la maturité du commerce international en tant que domaine de recherche (voir (Head and Mayer, 2014)). La structure apportée par les contributions théoriques sur les déterminants du commerce international a aidé les recherches empiriques et, inversement, la mise à l'épreuve empiriques des explications concurrentes du commerce international a aidé à valider ou invalider certains facteurs du commerce entre pays. Parce que l'approche "structurelle" ne cherche pas à se débarrasser de l'endogénéité associée aux systèmes complexes caractérisés par de multiples niveaux, des problèmes d'agrégation, des incitations contradictoires et des effets de boucles de rétroaction, elle est certainement mieux adaptée pour comprendre les forces d'attraction et de poussée de la mondialisation.

De ce point de vue, l'économie internationale trouve une complémentarité avec d'autres narratifs et d'autres épistémologies portant des discours sur la mondialisation comme les contributions de science politique ou les relations internationales. Dans son essai des années 1970 "Politique internationale et économie internationale : un cas de négligence mutuelle", Susan Strange souligne le vide académique entre les relations internationales et l'économie internationale. Elle appelle plutôt à une économie politique internationale qui accorderait une place de choix à la notion de pouvoir dans les discours sur la mondialisation. Conscient des forces et faiblesses épistémologique décrites plus haut, un dialogue fertile entre la science politique internationale et l'économie internationale pourrait permettre de questionner - au sein d'un cadre structuré et ayant vocation à être confronté aux données disponibles - le rôle du pouvoir politique dans la mondialisation, de l'émergence de normes et d'institutions transnationales et l'origine des tensions intra- et inter-nationale liée à la mondialisation, le tout dans un contexte d'incomplétude de la gouvernance politique mondiale.

Loin de parvenir à réaliser cet agenda de recherche, les trois chapitres de cette thèse tentent plus modestement de fournir une description empirique de divers aspects du ressac de mondialisation observé ces dernière années. Puisqu'ils sont centrés sur le comportement des États, les chapitres 1 et 3 tentent également de fournir un cadre théorique capable de capter les incitations des États dans un monde globalisé mais où leur espace politique est limité par d'autres acteurs et où aucune institution mondiale ne peut agir comme un planificateur central. Le second chapitre diffère légèrement dans la mesure où il est centré sur l'inadéquation de la comptabilité nationale (et donc

de l'élaboration des politiques nationales) avec la nature transnationale des entreprises multinationales. Cette thèse participe donc à décrire un monde globalisé mais où le cosmopolitisme reste hors de vue compte tenu des coûts cachés de la mondialisation, de la complexité et de la multitude d'intérêt divergents.

Chapitre 1: Déséquilibres commerciaux, déséquilibres fiscaux et montée du protectionnisme: données probantes des pays du G20

En mai 2017, Donald Trump a tweeté : "Nous avons un déficit commercial MASSIF avec l'Allemagne, et en plus, ils paient BEAUCOUP MOINS qu'ils ne le devraient pour l'OTAN et l'armée. Très mauvais pour les États-Unis. Ça va changer".

En avril 2018, en référence à la guerre commerciale avec la Chine, le président de l'époque a tweeté : "Quand vous êtes déjà à 500 milliards de dollars de déficit, vous n'avez rien à perdre !"

En décembre 2018, Trump a écrit : "Je suis un défenseur des tarifs douaniers. Lorsque des personnes ou des pays viennent piller les grandes richesses de notre nation, je veux au moins qu'ils paient. Notre puissance économique ! Nous recevons actuellement des milliards de dollars de droits de douane. RENDONS L'AMÉRIQUE RICHE DE NOUVEAU ".

Ces tweets pointent du doigt les déséquilibres commerciaux comme une origine potentielle des tensions commerciales. Devons-nous prendre ces tweets au sérieux et devons-nous penser qu'ils reflètent simplement les circonstances spécifiques de la présidence Trump désormais derrière nous ?

Les économistes se sont concentrés sur la quantification des conséquences des récentes tensions protectionnistes. Leur verdict est clairement négatif : par exemple, (Amiti et al., 2019) et (Fajgelbaum et al., 2020) explorent leur impact sur les prix et le bien-être. (Erceg et al., 2018) étudie l'impact de telles mesures dans un modèle néo-keynésien. La plupart des économistes estiment également que les tarifs douaniers et les politiques commerciales ont très peu d'effet sur les déséquilibres commerciaux multilatéraux qui sont imputés aux mouvements macroéconomiques de l'épargne et de l'investissement. Ceci est confirmé dans un modèle de petite économie ouverte par (Barattieri et al., 2021) et empiriquement par (Furceri et al., 2018). En nous appuyant sur la base de données Global Trade Alert (GTA) qui fournit des informations très riches sur les interventions protectionnistes bilatérales à partir de 2009 (Evenett et Fritz, 2020), nous analysons empirique-

ment les causes de la récente montée en puissance du protectionnisme et prenons au sérieux les tweets de Trump pour voir s'ils recoupent une réalité plus large sur le rôle des déséquilibres commerciaux bilatéraux. Notre analyse économétrique montre que les déséquilibres commerciaux bilatéraux constituent de solides prédicteurs des interventions protectionnistes. Ce n'est pas seulement le cas pour les États-Unis, bien que l'effet y soit plus fort que pour d'autres pays. On remarque également cette relation était déjà visible dans les données avant la présidence Trump et nos résultats suggèrent que les déséquilibres commerciaux continueront d'être une source de tensions commerciales après la présidence Trump. Ce lien entre déséquilibre commercial et regain du protectionnisme devrait intéresser à la fois les économistes du commerce international et les macroéconomistes. Le fait que les déséquilibres commerciaux multilatéraux provoquent des attaques protectionnistes suggère en effet que les déséquilibres mondiaux ne sont pas seulement préoccupants pour des raisons macroéconomiques, mais également en raison des tensions commerciales qu'ils provoquent.

Nous étudions également le rôle des politiques budgétaires dans la montée du protectionnisme. Il est reconnu depuis longtemps que la politique budgétaire des pays peut entraîner des déséquilibres commerciaux. C'est par exemple la position du FMI (voir Perspectives de l'économie mondiale (2020)) qui souligne que la politique budgétaire restrictive de l'Allemagne a contribuer à alimenter son important excédent commercial et qu'à l'inverse, la politique budgétaire expansionniste des États-Unis a creusé son déficit commercial. Ce résultat, dit des déficits jumeaux , est consistent avec le modèle Mundell-Fleming et trouve une validité empirique. Nous l'utilisons pour renforcer notre argumentation sur l'impact causal des déséquilibres commerciaux sur le protectionnisme. Pour ce faire, nous utilisons donc la balance budgétaire des pays comme instrument de leur balance commerciale multilatérale. Quant aux déséquilibres commerciaux bilatéraux entre deux pays, nous utilisons la différence des soldes budgétaires entre les deux, rapportés à la distance bilatérale. Ceci est également cohérent avec des recherches récentes qui soulignent l'interaction des facteurs macroéconomiques et des facteurs gravitaires comme moteurs cruciaux des balances commerciales bilatérales et globales (voir (Cunat and Zymek, 2023)). Nos résultats sur l'impact des déséquilibres commerciaux bilatéraux et multilatéraux sont robustes à cette stratégie de variables instrumentales.

Le résultat sous forme réduite selon lequel les paires de pays présentant de très grandes différences en matière de politiques budgétaires sont plus sujettes aux tensions protectionnistes est également intéressant en soi. Nos résultats suggèrent par exemple que dans le cas des États-Unis et de l'Allemagne (et plus généralement de l'UE), la différence de politique budgétaire entre les deux pays pourrait, au moins en partie, être à l'origine, par son impact sur les balances commerciales

bilatérales, de la attaques protectionnistes des États-Unis. L'impact quantitatif des déséquilibres commerciaux sur la montée du protectionnisme est importante pour les pays du G20 : une augmentation d'un écart-type de la balance commerciale bilatérale entre deux pays correspond à une augmentation de 7,3% d'intervention protectionnistes entre les deux pays. Nos résultats suggèrent donc que si la mondialisation, tant dans sa dimension commerciale que financière, a généré davantage de déséquilibres commerciaux bilatéraux et multilatéraux, elle peut également générer des forces protectionnistes susceptibles de la freiner de manière endogène. Les déséquilibres commerciaux sont également souvent considérés comme une source de préoccupation en raison de leurs conséquences macroéconomiques, notamment en termes d'accumulation de dette extérieure ou de déficit de demande.

Nos résultats suggèrent qu'ils ont un impact négatif supplémentaire puisqu'ils aggravent les tensions commerciales. Un écart transatlantique dans la relance fiscale au COVID pourrait être accompagné par un regain de tensions commerciales. Enfin, la coopération internationale en matière de politiques macroéconomiques (en particulier de politiques fiscales) a été considérée comme importante pour réduire la possibilité d'un problème de passager clandestin dans lequel des pays ayant des politiques budgétaires plus restrictives (et des excédents commerciaux plus importants) réduisent la demande mondiale mais profitent des politiques budgétaires expansionnistes d'autres pays. Il s'agit par exemple d'une critique adressée à certains pays de l'UE par les administrations américaines. Notre analyse suggère donc que les tensions protectionnistes qui trouvent leur origine dans les déséquilibres macroéconomiques ne disparaîtront pas avec la fin de la présidence Trump et que dans un contexte d'économie ouverte, l'absence de coordination internationale sur les politiques commerciale et budgétaire peut s'accompagner d'un retour de bâton et d'une progressive fermeture des économies sur elles-mêmes.

Chapitre 2: Ralentissement de la productivité et paradis fiscaux: où est mesurée la création de valeur ?

En 2021, la valeur ajoutée brute par heure travaillée dans le secteur marchand était deux fois plus importante en Irlande qu'en France. Sans remettre en cause la formidable productivité des travailleurs irlandais, leurs statistiques sont peut-être plus flatteuses qu'elles ne le sont en réalité et les Irlandais pourraient être considérablement aidés par le faible niveau d'imposition des sociétés. Dans ce chapitre, nous nous demandons dans quelle mesure l'évasion fiscale biaise les statistiques nationales et la mesure de la productivité en particulier.

Les entreprises multinationales (EMN) sont généralement de très grandes entreprises à forte in-

tensité en actifs intangibles et qui peuvent choisir stratégiquement la manière dont elles comptabilisent les activités et localisent leur profits à travers le monde. Cela peut fausser considérablement les statistiques locales ainsi que les agrégats étant donné l'opacité juridique et financière qui caractérise les paradis fiscaux. En particulier, dans un contexte d'intégration financière profonde et de concurrence fiscale internationale, la croissance de l'économie immatérielle a fourni aux multinationales de nouveaux outils pour délocaliser leurs bénéfices vers des pays à faible fiscalité. Ce déplacement des profits vers les paradis fiscaux conduit à minimiser artificiellement l'activité économique dans les pays à fiscalité élevée, conduisant à des sous-estimations d'un certain nombre d'agrégats, notamment la valeur ajoutée, les exportations et la productivité. Cette idée à notamment été suggéré par (Tørsløv et al., 2022), qui estiment qu'environ 40% des bénéfices mondiaux en 2015 ont été transférés vers des paradis fiscaux, et qui développent une méthode pour corriger les statistiques officielles mondiales. Ils suggèrent que dans le cas de la France, le déficit de la balance commerciale disparaît. En outre, la numérisation des activités poussant les entreprises à investir davantage dans les actifs incorporels a entraîné une augmentation constante de l'importance de l'investissement immatériel par rapport à l'investissement tangible au cours des 20 dernières années, qui a dépassé la part de l'investissement tangible dans le PIB des principaux pays avancés autour du monde.

Bien que les techniques permettant de réduire les paiements d'impôts au sein des multinationales existent depuis un certain temps, le découplage de la localisation des capitaux de la localisation de la production et de la valeur (par exemple les droits de propriété intellectuelle) et les prix de transfert (c'est-à-dire l'absence de prix de pleine concurrence) sont devenus beaucoup plus facile avec la montée rapide du capital immatériel. La question de la localisation de la création de valeur est donc centrale dans ce contexte.

Pour estimer l'ampleur de cette mauvaise mesure de la productivité liée à la fiscalité en France, le deuxième chapitre de cette thèse profite de la qualité des données administratives française pour exploiter un jeu de donné couvrant l'ensemble des entreprises françaises entre 1997 et 2015. Nous observons non seulement leur bilans mais également les liaisons financières des entreprises françaises partout dans le monde et donc le réseaux de filiales (étrangères et nationales, liées aux sociétés mères et filiales). Nous mettons en œuvre une approche par régression à double effet fixe afin d'estimer l'effet moyen du transfert de bénéfices sur la productivité mesurée des entreprises. Au sein de chaque entreprise l'évolution du transfert de bénéfices à l'étranger est approximé à partir de l'établissement d'une filiale dans un paradis fiscal. Ces entrées et sortie des paradis fiscaux sont ensuite comparés aux variations de productivité par firme. Cette étude par panel qui, en rejetant l'existence d'une tendance de pré-traitement, permet de montrer un lien systématique

entre variation de productivité observée en France et activité offshore.

D'un point de vue empirique, la stratégie d'identification décrite ci-dessus présente des faiblesses dans l'objectif d'établir la relation causale entre l'évasion fiscale et la mesure de la productivité en France. En effet, la décision de créer ou non une filiale dans une juridiction à faible fiscalité est une décision endogène qui peut elle-même dépendre de la productivité et de la rentabilité du groupe. On peut également penser à des facteurs communs tels que des changements au sein du top management pouvant affecter à la fois l'organisation internationale de l'entreprise et son activité en France (voir (Souillard, 2022)). Pour contourner cette menace d'identification, nous exploitons une décision de la Cour de justice européenne limitant la mesure dans laquelle les États membres peuvent appliquer des règles anti-abus aux multinationales européennes présentes dans les paradis fiscaux européens (voir (Schenkelberg, 2020) pour un première utilisation de cette décision). La décision Cadbury-Schweppes – du nom de l'entreprise qui a contesté au Royaume-Uni sa tentative de récupérer les bénéfices enregistrés dans ses filiales irlandaises – révèle que les entreprises qui ont de facto bénéficié de cette décision de justice – et donc ont pu s'engager plus facilement dans des stratégies d'optimisation fiscale - ont vu leur productivité diminuer.

Notre analyse aboutit à une baisse moyenne de 3% de la productivité du travail des entreprises et de 1% de la productivité totale des facteurs (PTF) des entreprises, ce qui est très probablement dû à une mauvaise mesure de la productivité résultant du transfert des bénéfices. Bien que les multinationales qui doivent des filiales dans des paradis fiscaux ne représentent qu'une infime fraction du nombre total d'entreprises, ces entreprises sont généralement de grande taille et sont connues pour être d'importants moteurs de fluctuation macroéconomique. Nous quantifions donc l'effet macroéconomique de cette estimation micro-économétrique. Cet exercice montre que l'optimisation budgétaire des multinationales au niveau micro se traduit par une baisse de 0,06 point de pourcentage de la croissance annuelle globale de la productivité du travail. Cela équivaut à une perte annuelle de 5,7% en termes de croissance annuelle globale de la productivité du travail.

La France constitue un cas intéressant car, depuis le milieu des années 2000, l'écart entre le taux d'imposition des sociétés en France et la moyenne internationale s'est accrue, poussé par la baisse de cette dernière, un phénomène connu comme la course vers le bas de l'impôt sur les sociétés. Toutefois, ce phénomène n'est pas l'apanage de la France et s'applique à tous les pays à haut taux d'imposition comme le montre Vicard (). Dans le cas américain, (Guvenen et al., 2022) se concentrent sur les multinationales américaines et utilisent une technique d'apportionnement pour retracer la véritable localisation de l'activité économique. Selon cette méthode, les revenus mon-

diaux totaux des multinationales américaines sont attribués à différentes juridictions en utilisant une combinaison de rémunération du travail et de ventes pays par pays. Ils évaluent l'impact du transfert de bénéfices des multinationales sur différents agrégats et montrent que l'effet sur la valeur ajoutée et donc sur la productivité, dépend de la période considérée. Ils estiment qu'entre 2004 et 2010, la croissance annuelle moyenne de la productivité du travail, corrigée des transferts de bénéfices, augmentera de 12 points de base.

Ce second chapitre montre donc que la nature transnationales des plus grandes entreprises leur permet de contourner la fiscalité nationale mais également la comptabilité et la statistique nationale. A l'heure où les appels à des politiques publiques guidées par l'empirique se font légion et où plans d'aides aux entreprises (comme par exemple après le Covid) reviennent à l'agenda, la question de l'inadéquation entre ces échelons se pose frontalement. D'autre part, d'un point de vue plus strictement académique, la nature des débats sur l'évolution tendancielle de la productivité manque de pertinence sans prise en compte de la nature extra-territoriale des entreprises multinationales.

Chapitre 3: Contentieux stratégiques dans un monde globalisé: comment les différends entre investisseurs et États façonnent la diffusion des politiques

Loin de la vision contractualiste d'une gouvernance mondiale bien organisée, le cadre juridique qui entoure l'économie mondiale est plutôt le résultat d'accords internationaux décentralisés signés entre États mais aussi le résultat des litiges et de précédents entre des sujets de droit établis à travers le monde. Dans le troisième chapitre, nous nous concentrons sur les différends entre investisseurs et États et étudions dans quelle mesure les décisions émanant des tribunaux de règlement des différends investisseurs-États (RDIE) – institutions *ad hoc* de règlement des différends en matière d'investissement - participent à façonner l'environnement réglementaire mondial.

Les mécanismes de règlement des différends entre investisseurs et États sont des tribunaux privés où les investisseurs (demandeur) peuvent poursuivre les gouvernements (défendeur) en justice pour violation des traités internationaux d'investissement liant leur pays d'origine et la juridiction d'origine de leur investissement. La prolifération des traités d'investissement bilatéraux et multilatéraux constitue une base juridique importante offrant aux investisseurs étrangers des moyens élargis pour contester les changements réglementaires préjudiciables ou les décisions gouvernementales défavorables. Par ailleurs, ce rapide essor du droit international de l'investissement, parce qu'il participe à une mondialisation des bases juridiques nationales, opère en dernière anal-

yse une mondialisation des cadres réglementaires nationaux.

Les récents différends liés à la sortie du charbon aux Pays-Bas, au moratoire sur l'exploration pétrolière en Italie ou – comme étudié dans cet article – à la réglementation anti-tabac en Australie et en Uruguay mettent en lumière l'espace réglementaire limité dont disposent les gouvernements. Liés aux investisseurs par des traités au très long cours, les États peuvent être incités à sous-réguler dans la crainte de faire face à des litiges juridiques. Cette hypothèse, connue dans le littérature comme frilosité réglementaire est difficile à tester dans les données tant il est difficile de mesure l'ambition législative des pays et compte tenu du fort degré d'endogénéité entre les décisions des États et celles des entreprises multinationales, dont les interactions sont caractérisée par une forte dimension stratégique. En effet, si l'hypothèse de frilosité réglementaire s'attache principalement à analyser le comportement des États sous la menace de jure de litige contre les investisseurs étrangers, elle mérite d'être raffinée en considérant la menace que représentent ces litiges de facto. A cet égard, les signaux envoyés par les entreprises multinationales sont important à comprendre et analyser. Étant donné que les décisions des arbitres dépendent à la fois du contenu juridique des traités juridiques et de l'historique des affaires RDIE antérieures, le risque de litige perçu par les États dépend en effet à la fois du portefeuille de traités d'investissement signés et du comportement des investisseurs étrangers à travers le monde. Dans ce contexte, certaines entreprises multinationales peuvent être incitées à initier des attaques dans certains pays afin de prévenir l'adoption de politique similaires dans d'autres juridictions. Cette stratégie, connue dans le cadre national sous le nom de procédures-bâillon, émerge dans le contexte global sous l'effet de la dense toile de traité d'investissement signés par les pays.

Dans le même temps, il est souvent souligné que la coordination internationale est essentielle pour faire face à des problèmes mondiaux tels que le réchauffement climatique, les pandémies ou la coordination fiscale internationale. La diffusion des politiques publiques et donc faciliter voire orchestrée par des institutions internationales. Deux mouvements contraires s'opposent : d'un côté, la participation de pays à des conventions internationales et les échanges d'expériences réglementaire poussent vers le haut les standards juridiques nationaux, d'un autre, l'émergence d'un droit international privé donne un à des sujets de droit transnationaux le pouvoir d'infléchir la loi de droit et de fait, limitant les ambitions réglementaires des pays. S'il apparaît paradoxal qu'une mondialisation plus poussée puisse également entraver la diffusion des politiques c'est pourtant ce que suggère la première partie de ce troisième chapitre. D'un point de vue théorique, une intégration juridique (ou mondialisation juridique) plus profonde – définie comme une corrélation plus élevée entre les chances de gain des investisseurs étrangers d'un pays à l'autre –

s'accompagne d'un risque accru de poursuites stratégiques et donc de frilosité réglementaire.

En utilisant les cas emblématiques de disputes entre investisseurs et États dans l'industrie du tabac, l'hypothèse selon laquelle les investisseurs pourraient intenter une action en justice afin d'entraver la diffusion de la politique antitabac est testée empiriquement. Les politologues ont récemment rassemblé des preuves qualitatives et quantitatives sur un éventuel effet de frisolité réglementaire des cas Investisseur-État, en aboutissant à la conclusion qu'il existe un risque sur la souveraineté de l'État, mais qu'il demeure limité (Moehlecke, 2019)). S'appuyant sur leurs travaux, la deuxième partie de ce dernier chapitre ajoute deux ingrédients clés aidant à comprendre la relation entre la mondialisation juridique et la diffusion des politiques : (1) la dimension dyadique de la diffusion des politiques et (2) l'interaction entre la présence de traités juridiques et les réseaux de fililales des multinationales. Plus précisément, nous estimons un modèle décrivant la probabilité d'adoption d'une politique selon que cette politique a été contestée ou non dans une juridiction voisine. En conservant la dimension des paires de pays, nous visons d'abord à évaluer dans quelle mesure les événements de conflit entre investisseurs et États exercent plus d'influence sur les pays les plus proches. Pour ce faire, nous nous appuyons sur des matrices pondérées où l'événement d'un ISDS est pondéré par le degré de proximité au sein de la paire de pays. Différents poids sont testés afin de capturer plusieurs déterminants de proximité. Informée par la littérature sur la gravité, notre spécification préférée utilise le commerce bilatéral comme mesure de pondération car elle résume de nombreux déterminants économiques, géographiques et culturels. Deuxièmement, nous testons la prédiction selon laquelle la combinaison de traités d'investissement en vigueur dans un pays avec un réseau de filiales d'entreprises multinationales du tabac constitue le signal le plus tangible du risque arbitral. S'il est en effet perçu comme tel par les gouvernements , ce signal est alors associé à une probabilité plus faible d'adoption de politiques. Nos résultats tendent à suggérer que c'est le cas.

Cherchant à quantifier cet effet, nous constatons que le litige intenté par Philip Morris contre la politique du paquet de cigarette neutre contre l'Australie a réduit le taux de risque en Nouvelle-Zélande de 4% (-1% : -6,5% à l'intervalle de confiance de 95%). Au-delà du cas de la politique de santé, la méthodologie développée dans ce chapitre devrait par exemple aider à comprendre les forces en jeu autour de différents sujets sur lesquels la politique pourrait et devrait se diffuser, comme les efforts internationaux visant à lutter contre l'évasion fiscale ou à sortir progressivement des énergies fossiles. D'un point de vue plus théorique, cet article suggère également que le droit des investissements joue un rôle important dans l'élaboration de l'environnement réglementaire mondial. L'augmentation rapide de la production multinationale combinée à la multiplication des traités d'investissement contenant des clauses ISDS augmentent le nombre de

précédents, qui modifient de fait l'espace politique des États nationaux. Les normes juridiques et les comportements réglementaires se diffusent de manière décentralisée participant à une forme de mondialisation sans cosmopolitisme.